

Live Assessment

Assessment Material

OCR Level 1/2 Cambridge National Award in Principles in
Engineering and Engineering Business
OCR Level 1/2 Cambridge National Certificate in Principles in
Engineering and Engineering Business

Unit R104: Optimising performance in engineering systems and products

Please note:

This OCR model assignment is to be used to provide evidence for the unit identified above. Alternatively, centres may 'tailor' or modify the assignment within permitted parameters (see Information for Teachers). It is the centre's responsibility to ensure that any modifications made to this assignment allow learners to show that they can meet all of the learning outcomes and provide sufficient opportunity for learners to demonstrate achievement across the full range of marks.

INSTRUCTIONS TO TEACHERS

The OCR administrative codes associated with this unit are:

- unit entry code R104
- certification codes Award J830 / Certificate J840

The accreditation numbers associated with this unit are:

- unit reference number D/505/3534
- qualification reference(s) Award [601/1272/4] / Certificate [601/17/1]
- **Duration: Approximately 10-12 hours**

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Contents

	Page Number(s)
INFORMATION FOR LEARNERS	3
Scenario for the assignment	4
This section contains the assignment background which learners will need to be familiar with in order to complete the tasks.	
Your Tasks	5
This section contains all the tasks learners must complete before work can be submitted for assessment.	
INFORMATION FOR TEACHERS	7
Guidance on using this assignment	8
This section provides guidance to centre staff on the preparation and completion of the assignment.	

Live Assessment: Information for Learners

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Unit R104: Optimising performance in engineering systems and products

Scenario for the Assignment

Engineered products and systems require maintenance at the manufacturer's prescribed intervals to maintain and optimise performance in operation. This requirement for maintenance plays an important role in the product design.

You have organised a summer job at a local tool and garden equipment hire business. Optimising performance and maintenance of the equipment which is hired out and subjected to heavy use is vital for the business to make a profit.

Read through all of the tasks carefully, so that you know what you will need to do to complete this assignment.

Your Tasks

Task 1: Perform a simple procedure to optimise product performance

Learning Outcome 4, Be able to perform simple procedures to optimise product/system performance, is assessed in this task.

The lawnmower engine shown in Fig.1 is an example of an engineered product that has been designed to be maintained at required intervals in order to optimise performance and component life.

You are to carry out oil and oil filter change:

- using the manufacturer's instruction manual to carry out the replacement tasks
- identifying indications of wear, contamination or impending component failure where appropriate
- carrying out simple performance checks
- demonstrating an appreciation of potential hazards and safety considerations.

You should demonstrate your ability to draw upon relevant skills/knowledge/understanding from other units you have studied in this task.

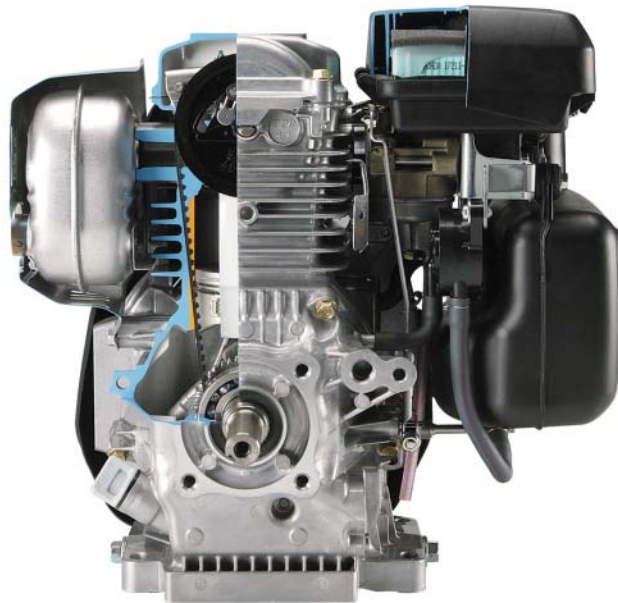


Fig.1

Task 2: Minimising component and system failure

Learning Outcome 3, Understand factors that contribute to system/product failure, is assessed in this task.

Systems and components such as those in the lawnmower engine sometimes fail prematurely in operation. Component and system failure can be attributed to a range of reasons.

Your task is to produce a report that considers:

- types of system/component failure in normal and adverse operating conditions
- reasons for each type of system/component failure

Task 3:

Learning Outcome 1, Understand why engineered systems and products are designed and maintained for optimum performance, is assessed in this task.

Most systems and products are designed for maintenance. The lawnmower is an example of product designed for planned maintenance.

You should present evidence that considers two different products or systems designed for maintenance, including:

- why systems and products are designed for maintenance
- reasons for maintenance and repair of systems and products
- implications of not maintaining systems and products

Task 4:

Learning Outcome 2, Know methods used in engineering sectors to maintain optimum performance, is assessed in this task.

There are many methods used to maintain optimum system and product performance.

You should present evidence of methods adopted to maintain optimum system and product performance for the products/systems used in Task 3, including:

- predictive
- preventative
- corrective
- improvement
- run to failure.

Information for Teachers

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Unit R104: Optimising performance in engineering systems and products

Guidance on using this assignment

1 General guidance

- 1.1 OCR assignments are available to download free of charge from our website:
www.ocr.org.uk
- 1.2 OCR assignments are intended to be used for summative assessment of learners. The OCR specification gives more information on the arrangements for assessing internally assessed units.
- 1.3 This assignment has been designed to meet the full assessment requirements of the unit. Learners will need to take part in a planned learning programme that covers the underpinning knowledge, understanding and skills of the unit.

2 Before carrying out the assignment

- 2.1 Learners should be provided with a copy of the *Information for Learners* section of this assignment.
- 2.2 Learners will not need to carry out any preparations prior to undertaking the assessment tasks, such as collating resources to use in the assessment
- 2.3 We have estimated that it will take approximately 10-12 hours to complete all tasks. Learners would need approximately 2-4 hours to complete Task 1 and approximately 2-3 hours to complete Task 2, and approximately 3-4 hours to complete Task 3 and approximately 2-3 hours to complete Task 4

These timings are for guidance only but should be used by the teacher to give learners an indication of how long to spend on each task. Centres can decide how the time can be allocated between each part or individual task. Centres are also permitted to spread the tasks across several sessions and therefore it is permissible for evidence to be produced over several sessions.

3 When completing the assignment and producing evidence

- 3.1 Each learner must produce individual and authentic evidence for each task within the assignment.
- 3.2 Centre staff may give support and guidance to learners. This support and guidance should focus on checking that learners understand what is expected of them and giving general feedback that enables the learner to take the initiative in making improvements, rather than detailing what amendments should be made. It is not acceptable for teachers/deliverers to provide answers, to work through answers in detail or to detail specifically what amendments should be made.
- 3.3 Learners may use information from any relevant source to help them with producing evidence for the tasks.

- 3.4 Learners must be guided on the use of information from other sources to ensure that confidentiality is maintained at all times.
- 3.5 Usually, the type of evidence required may be modified, with the exception of certain types of evidence listed below under '*Permitted changes*'. It is important to note that it is possible to generate the evidence in a variety of formats. Centres must advise learners as to the most appropriate format of evidence. The nature of this assessment means that learners are free to use the format that they feel is most appropriate for the purpose and target audience for each individual task (see Section 6).

4 Presentation of work for marking and moderation

- 4.1 Centres wishing to produce digital evidence in the form of an e-portfolio should refer to the appendix in the specification on guidance for the production of electronic assessment.
- 4.2 Centres may wish to discourage learners from excessive use of plastic wallets for presentation of their evidence as this may hinder the assessment process. Instead centres may wish to encourage learners to present their work so that it is easily accessible, e.g. spiral bound, stapled booklet, treasury tag.
- 4.3 All work must be marked against the marking criteria for the unit. Marks are allocated to learning outcomes rather than tasks. Please see Appendix B Marking criteria for centre assessment and Section 4 The centre assessed units in the specification for this qualification for more information on marking, moderation and submission of work.

5 Scope of permitted model assignment modification

The model assignment is self-contained in its present form. The set of tasks form a coherent whole addressing all the learning outcomes and allowing access to the full range of marks.

You must not change the following:

- the learning outcomes
- the marking criteria
- the requirements for supervision and authentication as described in the specification (Section 4 *The centre assessed units*)
- the maximum duration for completion of the assignment.

Permitted changes:

The model assignment can be modified in terms of the areas described below but centres must be sure that learners still have the opportunity to cover all of the learning outcomes and to access the full range of marks:

- the scenario, which can be contextualised or amended to suit local needs
- each specific task may be appropriately contextualised to match with any permitted changes you have made to the scenario.

OCR has ensured that in the language used and the tasks and scenario provided we have avoided discrimination, bias and stereotyping and support equality and diversity. In the development of qualifications and assessments we use the guidance given in the Ofqual publication *Fair access by design*, notably this includes:

- using language and layout in assessment materials that does not present barriers to learners
- using stimulus and source materials in assessment materials (where appropriate) that do not present barriers to learners.

If centres wish to modify the model assignment we strongly advise that staff responsible for modifying the model assignment and the quality assurance of it refer to the publication *Fair access by design*.

If modifications are made to the model assignment, whether to just the scenario or to both the scenario and individual tasks, it is up to the centre to ensure that all learning outcomes can still be met and that learners can access the full range of marks.

6 Specific guidance on the task

Task 1

Learners will carry out simple performance checks to check oil condition and levels and use the manufacturer's instructions to carry out oil and filter replacement using appropriate/specialist tools. Learners are required to handle and dispose of oils and parts appropriately and in a safe manner giving consideration to hazards to humans and the environment. For aspects of this task, learners should be encouraged to draw on knowledge, skills and understanding from other units in the specification. Evidence of checks and procedures will be provided in the portfolio supported by a detailed, signed witness statement.

Learners could use knowledge gained in unit R101 to relate their understanding of engineering principles to maintenance operations.

Task 2

Learners are required to investigate a range of types of system/component failure including stress fractures, fatigue, wear, seizure, vibration and corrosion. Learners should also demonstrate understanding reasons for the type of system/component failure including maladjustment, overloading, operational abuse, poor lubrication, malfunction and fouling. This task could be linked to LO2.

Task 3

Product case studies (e.g. lawnmower engine) should be used as the vehicle for assessment of this task. 2 different products/systems need to be considered.

Learners are required to report on the range of design for maintenance features with a clear understanding of the reasons for maintenance and repair, and the implications of not maintaining engineered systems/products. A tabulated, comparison or PowerPoint presentation approach could form suitable methods of evidence for this task.

Task 4

Learners should present evidence of methods used to maintain optimum performance for the products/systems used in Task 3 and include all of the following; predictive, preventive, corrective, improvement and run to failure.

Total marks for assignment: 60

Witness Statement – Task 1

LEARNER NAME	
Date	
Unit	Unit R104 – Optimising performance in engineering systems and products
LO4	Be able to perform simple procedures to optimise product/system performance

Independent working to carry out replacement tasks, appropriate use of tools, appreciation of potential hazards and safety considerations

Witness observations

Name of witness: _____

Relationship to learner: _____

Assessor comments: How the observations demonstrate achievement against the marking criteria

RECORD OF QUESTIONS/ANSWERS (if applicable)

ASSESSOR QUESTION 1	
LEARNER RESPONSE 1	
ASSESSOR QUESTION 2	
LEARNER RESPONSE 2	
ASSESSOR QUESTION 3	
LEARNER RESPONSE 3	

ASSESSOR SIGNATURE:		DATE:	
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LEARNER SIGNATURE:		DATE:	
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