

Live Assessment Material

Set Assignment

OCR Level 1/2 Cambridge National Certificate in Engineering Design

Units: R106: Product analysis and research
R107: Developing and presenting engineering designs
R108: 3D design realisation

Set A

Please note:

This OCR set assignment is to be used to provide evidence for the units 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 R106, R107, R108
- certification code Certificate J841

The qualification numbers associated with this unit are:

- unit reference numbers K/505/3536 - R/505/3546 - M/505/3537
- qualification number Certificate [601/1411/3]

Duration: Approximately 30-36 hours

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Version 3 July 2020 - Set A added to Front Cover, corrected formatting error in bulleted list for Task 3 (page 6), added bullet point to Task 2 (page 6) for greater clarity. Added teacher guidance for witness statement (page 10).

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Set Assignment: Information for Learners

OCR Level 1/2 Cambridge National Certificate in Engineering Design

Units: R106: Product analysis and research
R107: Developing and presenting engineering designs
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Scenario for the Assignment

Work holding is an essential element of safe working practices when using workshop equipment such as Computer Numeric Control (CNC) Routers and CNC Milling Machines.

Within schools, an easy to set-up and use method of work holding is required. In order to minimise waste the work holding solution must be able to hold small billets of materials.

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: Analysis of existing work holding solutions

Unit R106, Learning Outcome 1: Know how commercial production methods, quality and legislation impact on the design of products and components; Learning Outcome 2: Be able to research existing products; and Learning Outcome 3: Be able to analyse an existing product through disassembly, are assessed in this task.

The first stage in the development of the new work holding system requires you to undertake analysis of existing work holding devices.

Your analysis should include:

- the identification of strengths and weaknesses within existing work holding solutions through the use of primary and secondary research methods to consider:
 - structured disassembly considering components, assembly methods, materials, production methods and maintenance
- consideration of the impact of commercial production and manufacturing processes upon the design of existing work holding solutions
- consideration of the impact of product end of life considerations upon the design of existing work holding solutions
- consideration of the impact of conformity to legislation and standards upon the design of existing work holding solutions.

Task 2: Developing and presenting engineering designs

Unit R107 Learning Outcome 1: Be able to generate design proposals using a range of techniques; Learning Outcome 2: Know how to develop designs using engineering drawing techniques and annotation; and Learning Outcome 3: Be able to use Computer Aided Design (CAD) software and techniques to produce and communicate design proposals, are assessed in this task.

Having undertaken analysis of existing work holding solutions you are now to undertake the development of your design solution.

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

Your design work should:

- use freehand drawing techniques to present a range of initial concept ideas
- develop one of your concept ideas using formal engineering drawing techniques to present your design solutions
- use CAD applications to produce your final design proposal
- use appropriate techniques to present and communicate your final design
- your final design proposal must also include details of materials and manufacturing methods for your docking station.

Task 3: 3D design realisation

Unit R108 Learning Outcome 1: Know how to plan the making of a prototype; Learning Outcome 2: Understand safe working practices used when making a prototype; Learning Outcome 3: Be able to produce a prototype; and Learning Outcome 4: Be able to evaluate the success of a prototype, are assessed in this task.

You are to manufacture a prototype of the chosen work holding solution. A product specification is required in order to complete some aspects of the task. This product specification could be provided by your centre or developed by you.

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

You should:

- describe the key planning stages for the production planning
- produce a detailed plan for manufacture including risk assessment
- manufacture the prototype work holding solution
- produce an evaluation of the final prototype and production plan to include possible improvements
- evaluate your performance in the planning and manufacture of the prototype.

Information for Teachers

OCR Level 1/2 Cambridge National Certificate in Engineering Design

Units: R106: Product analysis and research
R107: Developing and presenting engineering designs
R108: 3D design realisation

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 30-36 hours to complete all tasks. Learners would need approximately 10-12 hours to complete Task 1 and approximately 10-12 hours to complete Task 2 and 10-12 hours to complete Task 3. 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 set assignment modification

The set 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 set 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.

Should the centre change the context of the assignment they must make sure that the product to be designed and prototyped is of equal complexity to that given in this set assignment.

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 set assignment, we strongly advise that staff responsible for modifying the set assignment and the quality assurance of it refer to the publication *Fair access by design*.

If modifications are made to the set 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 are expected to use both primary and secondary research methods when undertaking existing product research. Where possible, learners should use manufacturer's information to carry out structured disassembly of existing products whilst undertaking product analysis.

Task 2

Learners will require access to drawing boards, drawing instruments and CAD based drawing packages in order to complete this task. They should use a range of drawing techniques to present and enhance their design ideas. Detailed annotation of designs should be used to explain the function, material choice, assembly methods, etc. Appropriate techniques to present and communicate the final design could include display boards, models and power point. Isometric and exploded isometric would be regarded as two 3D techniques. Free hand sketching and instrument drawing would be regarded as two 2D techniques. CAD techniques may include rendering, texture, dimensions, assembly views, etc.

Learners could use knowledge gained in unit R105 to influence their design ideas.

Task 3

Ideally, the learners will base their planning and manufacture upon the design work in Task 2. Should the learner's design from Task 2 be inappropriate for Task 3, the centre should provide the learner with a working drawing that can be used to complete the required task. In order to successfully complete tasks for LO1 and LO4, the learner will need to develop a product specification. This product specification does not in itself attract marks from the marking criteria. The interpretation of the specification is integral for the award of marks for LO1 and LO4.

If required, the centre can provide learners with a suitable product specification.

Learners should consider the key planning stages when producing their production plan which are listed in Learning outcome 1 of Unit R108.

Learners must provide evidence of the manufacturing in the form of text, photographs or video and screenshots. Learners can manufacture their prototype solutions using appropriate materials or CAD/CAM methods. A witness statement should be used to corroborate the level of independence with which learners used tools, machines and safe working practices to make a prototype. Learners could use knowledge gained in unit R105 to influence the manufacturing processes used in the production of their model/prototype.

Total marks for assignment: 60

Witness Statement – Task 3

LEARNER NAME	
Date	
Unit	R108 – 3D design realisation
LO2	Understand safe working practices used when making a prototype

Independent working to manufacture, whilst following appropriate safety precautions	
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:

LEARNER SIGNATURE:

DATE: