

Contents

| | Page number(s) |
|---|-------------------------|
| INFORMATION FOR LEARNERS Scenario for the assignment This section contains the assignment background which learners will need to be familiar with in order to complete the tasks. | 3 4 |
| Your Tasks This section contains all the tasks learners must complete before work can be submitted for assessment. | 5–6 |
| INFORMATION FOR TEACHERS Guidance on using this assignment This section provides guidance to centre staff on the preparation and completion of the assignment. | 7 8–14 |

OCR-set Assignment

Information for Learners

OCR Level 1 / 2 Cambridge National Certificate in Systems Control in
Engineering

Unit R115: Engineering applications of computers

Scenario for the assignment

Computers and microprocessors play a key role in the design, development and manufacture of engineered products, such as the car shown on the production line.

The cars shown have been designed and developed using advanced computer systems and software and are manufactured using automated manufacturing facilities.



Computers also enable the monitoring and reporting of system performance, communicating this information and data around the system and to the user.

The hand-held data monitor shown assists the user to diagnose performance and operation of the car and enables maintenance to be more effectively performed.



An engineering manufacturer wants to expand their production facility and is planning to improve the computerised design and manufacture of their products. They want to consider how computerised systems can be used to monitor and improve manufacturing performance, and to inform maintenance operations.

To ensure that the investment in automation technology is spent wisely, the managing director wishes to gain a detailed understanding of computerised automation within engineering.

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 – Computers in engineering design, manufacture and process control

Learning Outcome 1, Understand how computers are used in engineering design, manufacture and process control, is assessed in this task.

Engineered products are often designed and manufactured using computerised systems.

You are to investigate how computers are used within:

- engineering design,
- engineering manufacture and
- process control.

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

Task 2 – Computers and maintenance

Learning Outcome 2, Understand how computers are used for maintenance of engineering systems, is assessed in this task.

Human Machine Interface (HMI) and expert systems are used within engineering to communicate system operation, diagnostic and maintenance information. They can inform the user/operator that they are working correctly; diagnose any faults and assist with maintenance.

Your task is to:

- investigate how HMI **and** expert systems are used to:
 - communicate operation of a system or machine to the user or operator;
 - diagnose any problems with its correct operation;
 - assist the operator or maintenance personnel with maintenance of the system or machine.
- identify and access a system that uses an HMI or expert system to:
 - interrogate the system (e.g. look at operation and fault data);
 - interpret the data (e.g. explain what the data means);
 - recommend any corrections or modifications to the system based on this data.

Task 3 – Computers and communication of production and maintenance data

Learning Outcome 3, Know how computers are used to communicate and use data for production and maintenance, is assessed in this task.

Computers used in the production of engineered products gather and communicate data with operators and users, and between themselves. This data can be used to analyse the efficiency of the production process and can also be used to assist with maintenance.

You will investigate and explain:

- how data gathered during **production operations** is used in order to ensure that production is as efficient as it can be
- how data collected during **production operations** is used to assist with **maintenance** for the reliability, accuracy and efficiency of the system or machine
- how computers are used to gather, communicate and exchange data required to help **maintenance** personnel perform the required **maintenance operations**
- how hand-held computers are used both within the **manufacturing process** and for **maintenance**.

OCR-set Assignment

Information for Teachers

OCR Level 1 / 2 Cambridge National Certificate in Systems Control in
Engineering

Unit R115: Engineering applications of computers

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 2–3 hours to complete Task 1 and approximately 6–7 hours to complete Task 2 and 2 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.

A thematic approach linking Learning Outcome 1 (LO1) through LO2 to LO3 is desirable for the assignment, although it must be noted that access to a Human Machine Interface (HMI) or expert system is required in LO2. This might not be the same equipment that is used in the manufacture of the chosen scenario or case study, which is acceptable.

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

A product case study (e.g. car design and manufacture) could be used as the focus for assessment of this task. Learners are required to investigate how computers are used from design through to manufacture, identifying how they are used in the design process, manufacture, dispatch and delivery of the product. From the manufacturing aspect they can further investigate how computers are used in process control. Within this task, learners should be encouraged to draw on knowledge, skills and understanding from other units in the specification.

Learners could use knowledge gained in unit R113 to understand the process of automatic system testing.

Task 2

Learners are required to investigate and explain how both Human Machine Interface (HMI) **and** expert systems work in order to communicate system operational information, and how they are used in diagnostics and maintenance. This task could be linked with LO1.

They are also required to have access to an HMI **or** expert system in order to interrogate it to obtain data. The data needs to be analysed in order to make recommendations for modifications or corrections to the system. Only one type of system needs to be accessed and appropriate risk assessment and safe working procedures must be followed whilst accessing the system. Evidence of HMI/expert system interrogation and analysis should be supported by a signed witness statement and may be in the form of text, photographs or video and screenshots. In the absence of access to a suitable physical system, a demonstration could be used to present a typical system and learners provided with data to analyse.

Task 3

A product case study (e.g. car manufacture) could be used as the focus for assessment of this task and it could be linked to LO2 and LO3.

Learners are required to investigate and explain how computers used in manufacture communicate and utilise data for production and maintenance. There are three fundamental aspects to consider:

- how production data gathered during the production process is analysed to inform production operations;
- how data gathered during the production process is used to inform maintenance;
- how data is used for maintenance operations.

It is recommended that the examples given in the specification for LO3 be considered carefully as guidance.

Learners are also required to investigate and explain how hand-held computer devices are used in both manufacturing **and** maintenance operations.

Total marks for assignment: 60

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Witness Statement – Task 2

| | |
|---------------------|---|
| LEARNER NAME | |
| Date | |
| Unit | R115 – Engineering applications of computers |
| LO2 | Be able to interrogate an HMI or expert system and act upon information obtained. |

| Independent working to manufacture, appropriate safety precautions and testing | |
|---|--|
| 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 |
| |

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|----------------------------|--|--------------|--|
| ASSESSOR SIGNATURE: | | DATE: | |
|----------------------------|--|--------------|--|

| | | | |
|---------------------------|--|--------------|--|
| LEARNER SIGNATURE: | | DATE: | |
|---------------------------|--|--------------|--|