

Unit R104 – Optimising Performance in Engineering Systems and Products

Design for maintenance and repair *Instructions and answers for teachers*

These instructions should accompany the OCR resource ‘Design for maintenance and repair’ activity which supports OCR Cambridge Nationals in Engineering.



The Activity:

This resource comprises of 1 task. The activities are best completed either in pairs or small groups. Learners may need to use online resources to research material uses or check their understanding to complete the activity.



This activity offers an opportunity for English skills development.

Associated materials:

‘Design for Maintenance and Repair’ learner activity sheet

Suggested timings:

Tasks 1: 1 hour

Task 1



Workshop equipment requires regular maintenance and eventually repairs to be carried out.

Select an item of workshop equipment to analyse which parts of the equipment require regular servicing. You should report on the following areas.

You are not required to disassemble the equipment in this task.

1. Which parts require servicing?

Example answers as a result of learner's research:

Most parts of the compressor require serving. These include the engine, the reservoir, the air supply plumbing and components, filtration systems.

2. What features require the product to be maintained for quality and performance?

To maintain optimum performance, the compressor is designed to have water traps drained, filters cleaned regularly, lubricating oil levels maintained, security and containment of potential compressed air leaks, drive belt tension.

3. Which parts are designed to be replaced as part of maintenance and repairs?

The components designed to be replaced as part of maintenance include; filters (water, air) drive belts, lubricating oils, pipe fittings and fixings, valves.

4. Which parts are likely to require repair at some time?

The main engine components such as pistons and rings, valves and bearings could require replacement but it may be that a complete engine unit is replaced to save downtime with the worn engine unit being returned to the supplier for specialist remanufacture or scrap, depending on the most cost effective solution. Worn pulleys and drive components could be replaced as part of repair procedures. Pipe work maintained for security and leaks.

5. What features of the equipment make it easy to maintain and repair?

The compressor and its components are mainly exposed to allow easy access and cooling. Sometimes the compressor will be housed in a ventilated enclosure to reduce noise and keep the noise generated away from the workforce; compressed air output supply piping makes this possible. Drive belts are accessible through removing a cowling or cover guard. Filtration components are easily accessible due to the need for visual inspection.

6. What materials used as part of the maintenance procedure will need to be disposed of?

Filters used to filter the air that collect contaminated and particles that are removed for the compressed air supply and water vapour. Worn drive belts and oil used to lubricate the engine components will need to be disposed of as well as any packaging used for filters, and oil.

7. What are the environmental considerations for disposing of waste packaging and consumables?

Waste oil will need to be collected and disposed at appropriate recycling/collection points and not put into the waste for landfill otherwise contamination with potential risks to the environment, wildlife and water supply may occur. Paper, cardboard and plastic packaging recycling is widely available.

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OCR Resources: *the small print*

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