Unit 9: Developing Skills in Routine Servicing of Mechanical Equipment

Unit reference number: R/601/0125

QCF level: 1

Credit value: 3

Guided learning hours: 30

Unit aim

This unit introduces learners to the skills needed to carry out the routine servicing of mechanical equipment. It will give them the opportunity to think about the necessary precautions and safety requirements when carrying out a routine service on mechanical systems or equipment by learning about equipment, fluid systems, components and operating mechanisms. This unit provides some of the knowledge, understanding and skills for the Level 1 Performing Engineering Operations NOS Unit 10: Carrying Out Routine Servicing of Mechanical Equipment.

Unit introduction

In this unit learners will explore the activities involved in the routine servicing of mechanical systems or equipment. When carrying out servicing activities they will learn about the necessary safety requirements, and routine servicing equipment, components and systems.

Learners will be involved in the practical activities associated with the routine servicing of a mechanical system or piece of equipment. They will be able to demonstrate that they can prepare for the service, and also take the necessary precautions to ensure the service is carried out safely and correctly. Learners will have an opportunity to make adjustments, such as setting a belt tension, check and fill fluid levels, test and check for leaks and replace components. Having carried out a routine service on a mechanical system or piece of equipment learners will show that they can leave the work area in a safe and tidy condition and that they have carried out the service to a reasonable standard.

Essential resources

A typical centre engineering workshop should be equipped with the basic requirements of this unit including a range of mechanical systems or equipment and components, tools and equipment for servicing operations. All supporting auxiliary equipment should also be available together with appropriate safety equipment.

Workshops should be staffed appropriately to ensure health and safety requirements are met. Technician support may be required during practical work.

Learning outcomes, assessment criteria and unit amplification

To pass this unit, the learner needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria determine the standard required to achieve the unit.

Learning outcomes		Assessment criteria		Unit amplification
1	Know about routine mechanical servicing operations	1.1	List what to do for the routine servicing of a given mechanical system/equipment	□ *Mechanical servicing operations*: making adjustments to equipment eg adjusting clearances, setting belt tensions, setting operating mechanisms like levers and linkages, setting air line pressures; checking and filling fluid and/or lubrication systems eg topping up oil, fluid or coolant levels, removing excess dirt and grime; making prescribed tests and checks eg checks on self-diagnostic systems, tests for air or fluid leaks, functionality checks; carrying out visual checks eg for damage, excessive wear on belts or chains, leaking seals, contaminated lubricants; changing 'lifed' components for example filter lubricants, hydraulic fluids, coolants, seals, gaskets, locking devices; checking all pipework and flexible hoses eg checking pipe joints and connectors are tight and free from damage and leaks; replacing and/or remaking all seals, joints and pipe work which is not serviceable
		1.2	Tell your supervisor what you are going to do when servicing a different given mechanical system/equipment	

Learning outcomes		Assessment criteria		Unit amplification
2	Be able to service mechanical equipment and systems safely.	2.1	Follow safe working practices and procedures when carrying out mechanical servicing operations	□ *Safe working practices and procedures*: making sure equipment is safe to work on eg isolated, out of service and use; wearing protective clothing eg overalls, safety shoes, eye protection, gloves and/or barrier creams; complying with regulations and organisational safety procedures eg permit to work; keeping the work area free of waste materials, surplus materials, tools/equipment; checking that all servicing operations have been completed, all guards and covers have been replaced and there are no oil or fluid leaks
		2.2	Carry out a routine service for a given mechanical system/equipment	□ *Mechanical equipment and systems*: examples of suitable equipment could include pumps, valves, engines, gearboxes, fluid power systems, heating, ventilating and refrigeration systems, drive and control systems/mechanisms; systems including fluids eg lubricants, coolants, hydraulics; non-serviceable components/'lifed' components eg belts, filters, gaskets; operating mechanisms eg belts, chains, levers, cams

Information for tutors

Delivery

This unit is about preparing for and carrying out routine mechanical servicing operations correctly and safely. It therefore lends itself to be delivered in a holistic way and by learners practising in the workshop and reflecting on the experiences gained relating to safety and correct adjustments, checking and filling fluid and/or lubrication systems, carrying out prescribed tests and checks, and changing components when carrying out these operations.

A key part of delivery is therefore likely to be demonstration and practice which should be carried out on more than one system or piece of equipment. This is where the major part of the time will be spent during delivery although some awareness raising may be needed in a safe environment such as a classroom. Although the second learning outcome is practical in nature some underpinning knowledge will need to be established before learners are allowed access to the practical activities. This, in fact, is the essence of the first learning outcome which is knowledge based. Further checking of this may be best achieved through question and answer sessions. Other activities such as 'card games' or 'word searches' etc may also be appropriate and helpful.

Outline learning plan

The outline learning plan has been included in this unit as guidance.

Topic and suggested assignments/activities
Know about routine mechanical servicing operations
Whole-class, tutor-led discussions about the importance of good preparation.
Whole-class, tutor-led demonstration of good practice and preparation in the servicing or mechanical workshop.
Individual practice of routine operations, led by the tutor. Individuals work on different servicing operations such as making adjustments, checking and filling fluid and/or lubrication systems, carrying out prescribed tests and checks, and changing components on simple mechanical equipment or systems, such as pumps, valves, engines, gearboxes, fluid power systems, heating, ventilating and refrigeration systems, drive and control systems/mechanisms and systems including fluids.
Individual activity listing what learners carried out, what safety issues arose and the precautions taken etc.
Whole-class discussion on what each individual carried out during the servicing operations.
Individual summative assessment activity – listing what needs to be carried out for a given servicing operation, addressing 1.1.
Assessment 1.2 is likely to be achieved within activities to meet the requirements of the second learning outcome, where learners should be asked what they are going to do when servicing a different given mechanical system/piece of equipment.

Topic and suggested assignments/activities
Be able to service mechanical equipment and systems safely Individual activity completing 'gapped handouts' about safety aspects etc. Further whole-class, tutor-led demonstration of the routine servicing of mechanical systems/equipment. Further individual activity, practising servicing mechanical systems/equipment, with formative checks until learners show a reasonable level of competence and safety. Individual summative assessment activity. This will take a large proportion of the time for this part of this learning outcome.

Assessment

The centre will devise and mark the assessment for this unit.

Learners must meet all assessment criteria to pass the unit.

Due to the nature of the assessment requirements of this unit it is likely that the summative assessment will take a large proportion of the time assigned to the unit. Learners should only be assessed once the tutor is comfortable with their level of competence developed during the formative stages of the practical activities.

Two assignments could be developed to address the assessment criteria. The first assignment could address 1.1 as a stand-alone activity listing what to carry out for the routine service of given mechanical system/equipment. The second assignment should be based on the practical activity of routine servicing a mechanical system or piece of equipment correctly and safely. The given mechanical system or equipment must be different to that given for 1.1. This does mean that most of the evidence for 2.1 and 2.2 will be in the form of witness statements/observation records supported by annotated photographs of what learners carried out and work area layout and system or equipment serviced, along with notes, servicing logs or listings etc 1.2 will also require a statement about what learners said during the activity, and authenticated as such.

The routine service allocated to each learner must include a range of opportunities for them to take appropriate precautions before they prepare for and start the service activity in a correct and safe manner. The mechanical system/equipment must enable learners to make adjustments, check and fill fluid and/or a lubrication system, carry out prescribed tests and checks, including visual checks, change 'lifed' components, and check all pipework and flexible hoses. Typical systems and equipment are given in the unit content under learning outcome 2. This would add relevance to this activity. When designating the service to be carried out care must be taken to ensure a non-serviceable component is included, and that learners have opportunities to show that the service is carried out correctly, checked and returned to use.

Suggested resources

Books

Mobley R K – *Maintenance Fundamentals* (Butterworth-Heinemann, 2004) ISBN 978-0750677981

Salmon D – *NVQ Engineering Level 2 Mechanical Units* (Longman, 1998) ISBN 978-0582302990

Salmon, Powdril – *Mechanical Engineering: Level 2 NVQ: Performing Engineering Operations* (Newnes, 2002) IBSN 978-0750654067

The following are examples of materials that support understanding of more complex equipment and systems.

Dixon G – *Dishwasher Manual: DIY Plumbing, Fault-finding, Repair and Maintenance* (Hardcover) (Haynes, 2009) ISBN 978-1844255559

Dixon G – *The Washing Machine Manual: DIY Plumbing, Fault-finding, Repair and Maintenance* (Hardcover) (Haynes, 2007) ISBN 978-1844253487

Magazines

Engineering – (The Engineering Magazine) ISSN 0013-7782

Engineering & Technology Magazine

Other publications

Manufacturers' manuals and data sheets