

Unit 32: Working with Land-based Tool Hire Machinery and Mechanisms

Unit code:	Y/601/4290
QCF Level 3:	BTEC National
Credit value:	10
Guided learning hours:	60

● Aim and purpose

This unit aims to introduce learners to the skills and understanding in tool and plant hire machinery and equipment and how these can be applied in practice. It is designed for learners in centre-based settings looking to progress into the sector or onto further/higher education.

● Unit introduction

Recent developments within the tool hire industry have led to improved systems and controls within the manufacturing of equipment. Health and safety legislation within the tool hire sector has put greater demands on manufacturers and contractors for equipment to be better and safer. Tool hire equipment is now more sophisticated and diverse to meet the demands of customers and owners alike with a very diverse range of equipment.

This unit gives learners the opportunity to study tool hire equipment and the need for accurate fault diagnosis and repair. It also covers health and safety issues encountered when carrying out related service and repair activities.

Learners will develop an understanding of tool hire equipment and their assemblies, and also the skills to identify faults and carry out repairs.

● Learning outcomes

On completion of this unit a learner should:

- 1 Understand the function and operation of tool and plant hire machinery and equipment
- 2 Understand maintenance requirements and schedules for tool and plant hire machinery and equipment
- 3 Be able to perform the handover of land-based machinery and equipment
- 4 Be able to inspect, maintain and service tool and plant hire machinery and equipment
- 5 Be able to carry out fault diagnosis and test procedures on tool and plant hire machinery and equipment.

Unit content

1 Understand the function and operation of tool and plant hire machinery and equipment

Tracks, running gear, rollers: steel tracks; rubber tracks; sprockets and idlers and undercarriages

Ground engaging equipment: blades; buckets; breakers; augers; common causes of component failure

Ground consolidation equipment: vibratory rollers; vibration plates; trench rollers; common causes of component failure

Other equipment: electrical equipment eg floor saws, drills, scablers, pressure washers, submersible pumps; pneumatic equipment eg compressors, breakers, drills and dryers

Hydraulic equipment: eg breakers, power heads, mini diggers; common causes of component failure; health and safety

2 Understand maintenance requirements and schedules for tool and plant hire machinery and equipment

Maintenance: reasons for maintenance and servicing; use of manufacturers' service manuals and data; pre-use maintenance (complete service, workshop adjustments, security of fixtures and fastenings); in-use maintenance (daily pre-start checks and lubrication, operational/site adjustments); post-use maintenance (corrosion protection, replacement of worn parts, storage procedures); strategies (proactive, predictive/periodic and continuous, replacement); maintenance practices eg on-board condition monitoring; costs;

Health and safety: personal protective equipment (PPE); risk assessments; relevant, current legislation eg Health and Safety at Work Act 1974, Control of Substances Hazardous to Health Regulations 2002 (COSHH); Provision and Use of Work Equipment Regulations 1998 (PUWER), Lifting Operations and Lifting Equipment Regulations 1998 (LOLER); environmental management of maintenance activities

3 Be able to perform the handover of land-based machinery and equipment

Handover procedures: handover procedures (including any statutory requirements) for a specific item; procedures for familiarising the hirer with the specific machine's operational controls; procedures for operating the machinery/equipment safely and correctly; pre-delivery inspection (PDI); daily/weekly and safety checks; emergency shutdown and isolation procedures; specialist PPE; record and documentation systems and procedures; the necessary documentation for the specific items of equipment; safety literature; operating instructions; acceptance receipts; records of test certificates; risk assessments; method statements

4 Be able to inspect, maintain and service tool and plant hire machinery and equipment

Documentation: quality assurance; manufacturers' data; service and maintenance schedules and records; repair history (proactive, periodic and continuous)

Maintenance procedures: manufacturers' workshop manuals, service bulletins, replacement and overhaul, fault finding; health and safety; pre-delivery inspection (PDI); waste disposal

5 Be able to carry out fault diagnosis and test procedures on tool and plant hire machinery and equipment

Perform diagnostic checks: sensory; customer questioning; diagnostic testing and repair; health and safety; risk assessment

Current relevant laws and regulations: eg Health and Safety at Work Act 1974, COSHH regulations, construction and use regulations, Provision and Use of Work Equipment Regulations 1998 (PUWER), Lifting Operations and Lifting Equipment 1998 (LOLER); risk assessment; Portable Appliance Testing (PAT)

Performance: manufacturers' specifications and customer requirements

Assessment and grading criteria

In order to pass this unit, the evidence that the learner presents for assessment needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria for a pass grade describe the level of achievement required to pass this unit.

Assessment and grading criteria		
To achieve a pass grade the evidence must show that the learner is able to:	To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:	To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:
P1 explain the function and operation of small hand-held hire equipment [IE, CT, SM]	M1 compare the capabilities of hand held and non hand-held hire machinery to meet given operational objectives	D1 compare the maintenance requirements of pneumatic and hydraulic operating systems on selected tool and plant hire machinery and equipment
P2 explain the function and operation of non hand-held hire machinery and equipment [IE, CT, SM]		
P3 explain the maintenance requirements of small hand-held hire equipment [IE, CT, SM]	M2 produce a maintenance schedule for hand held and non-hand held hire machinery	
P4 explain the maintenance requirements of non hand-held hire machinery and equipment [IE, CT, SM]		
P5 carry out pre-delivery inspection of machinery and equipment [EP, TW, SM]	M3 produce a method statement for a hand held and non-hand held item of hire machinery to meet given operational objectives	D2 evaluate a set of given wear limit figures and compare them against manufacturers' specifications.
P6 explain to user safe operation and maintenance of small hand-held hire equipment [IE, CT, SM]		
P7 explain to user safe operation and maintenance of non hand-held machinery and equipment [IE, CT, SM]		

Assessment and grading criteria		
To achieve a pass grade the evidence must show that the learner is able to:	To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:	To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:
P8 safely inspect, maintain and service selected small hand-held hire equipment using manufacturers' service data [EP, TW, SM]	M4 discuss laws and regulations that apply to the testing of given tool and plant hire machinery and equipment.	
P9 safely inspect, maintain and service selected non hand-held hire machinery and equipment using manufacturers' service data [EP, TW, SM]		
P10 safely carry out fault finding and testing procedures on selected small hand-held equipment [EP, TW, SM]		
P11 safely carry out fault finding and testing procedures on selected non hand-held machinery and equipment [EP, TW, SM]		
P12 report on status of machinery and equipment as a result of tests carried out. [IE, CT, SM, RL]		

PLTS: This summary references where applicable in the pass criteria, in the square brackets, the elements of the personal, learning and thinking skills. It identifies opportunities for learners to demonstrate effective application of the referenced elements of the skills.

Key	IE – independent enquirers	RL – reflective learners	SM – self-managers
	CT – creative thinkers	TW – team workers	EP – effective participators

Essential guidance for tutors

Delivery

Delivery of this unit will involve practical assessments, written assessment, visits to suitable collections and will link to industrial experience placements.

Tutors delivering this unit have opportunities to use as wide a range of techniques as possible. Lectures, discussions, seminar presentations, site visits, supervised workshop activities, practicals, internet and/or library-based research and the use of personal and/or industrial experience would all be suitable. Delivery should stimulate, motivate, educate and enthuse learners.

Work placements should be monitored regularly in order to ensure the quality of the learning experience. It would be beneficial if learners and supervisors were made aware of the requirements of this unit before any work-related activities so that naturally occurring evidence can be collected at the time. For example, learners may have the opportunity to repair a piece of tool hire machinery and they should be encouraged to ask for observation records and/or witness statements to be provided as evidence of this. Guidance on the use of observation records and witness statements is provided on the Edexcel website.

Whichever delivery methods are used, it is essential that tutors stress the importance of sound environmental management and the need to manage equipment using legal methods.

Health and safety issues relating to workshop situations must be stressed and reinforced regularly, and risk assessments must be undertaken before practical activities. Adequate PPE must be provided and used following the production of suitable risk assessments.

Tutors should consider integrating the delivery, private study and assessment for this unit with other relevant units and assessment instruments learners are taking as part of their programme of study.

Learning outcomes 1 and 2 cover the theoretical aspects of tool hire machinery and mechanisms. They are likely to be delivered through formal lectures, discussion, possible site visits, demonstration and supervised practical sessions and independent learner research.

Learning outcomes 3, 4 and 5 look at the handing over, maintenance, fault diagnosis, inspection and repair of tool hire machinery and mechanisms. These can be delivered as individual practical sessions as well as through formal lectures and discussions. Health and safety within the workshop must be paramount at all times.

Outline learning plan

The outline learning plan has been included in this unit as guidance and can be used in conjunction with the programme of suggested assignments.

The outline learning plan gives **an indication of the volume of learning it would take the average learner** to achieve the learning outcomes. It is **indicative and is one way of achieving the credit value**.

Learning time should address all learning (including assessment) relevant to the learning outcomes, regardless of where, when and how the learning has taken place.

Topic and suggested assignments/activities and/assessment

Introduction to the unit.

Assignment 1: The Function and Operation of Tool Hire Machinery and Mechanisms (P1,P2,M1)

Introduction to the assignment and learner-centred research.

The function and operation of small hand-held and non-hand-held tool hire machinery and mechanisms.

Topic and suggested assignments/activities and/assessment
<p>Assignment 2: Understand the Maintenance Requirements of Tool Hire Machinery and Mechanisms (P3,P4, M2, D1)</p> <p>Introduction to the assignment and learner-centred research.</p> <p>The maintenance requirements of small hand-held and non-hand-held tool hire machinery and mechanisms.</p>
<p>Assignment 3: Be able to Handover Tool Hire Machinery and Mechanisms (P5, P6, P7 M3)</p> <p>Introduction to the assignment and learner-centred practical.</p> <p>Handover to the control of others small hand-held and non-hand-held tool hire machinery and mechanisms.</p>
<p>Assignment 4: Be able to Carry out Maintenance and Inspection of Tool Hire Machinery and Mechanisms (P8, P9, M4, D2)</p> <p>Introduction to the assignment and learner-centred practical.</p> <p>Carry out maintenance and inspection to tool hire machinery and mechanisms.</p>
<p>Assignment 5: Be able to Carry out Fault Diagnosis and Repair to Tool Hire Machinery and Mechanisms (P10, P11, P12)</p> <p>Introduction to the assignment and learner-centred practical.</p> <p>Carry out fault diagnosis and repair on tool hire machinery and mechanisms.</p> <p>Unit review.</p>

Assessment

For P1 and P2, learners must describe the function and operation of small hand held and non-hand-held tool hire machinery and mechanisms. Tutors should identify the machines or agree them through discussion with learners. Where possible, to ensure fairness of assessment the size and complexity of the task should be the same for all learners. It is expected that, as a minimum, learners will provide evidence for two hand-held and two non-hand-held items of tool hire machinery and mechanisms, preferably those commonly used in the land-based industry sector that is the learners' primary interest area.

For P3 and P4, learners must explain the maintenance requirements of small hand held and non-hand-held tool hire machinery and mechanisms. Tutors should identify the machines or agree them through discussion with learners. Where possible, to ensure fairness of assessment the size and complexity of the task should be the same for all learners. It is expected that, as a minimum, learners will provide evidence for two hand-held and two non-hand-held items of tool hire machinery and mechanisms, preferably those commonly used in the land-based industry sector that is the learners' primary interest area. Evidence may be in the same format as for P1 and P2.

For P5, learners must carry out a pre-delivery hire inspection on small hand-held and non-hand-held tool hire machinery and mechanisms. Tutors should identify the machines or agree them through discussion with learners. Where possible, to ensure fairness of assessment the size and complexity of the task should be the same for all learners. It is expected that, as a minimum, learners will provide evidence for one hand-held and one non-hand held items of tool hire machinery and mechanisms, preferably those commonly used in the land-based industry sector that is the learners' primary interest area.

For P6 and P7, learners must explain to an end user how to complete pre-use checks and operate small hand-held and non-hand-held tool hire machinery and mechanisms safely. Tutors should identify the machines or agree them through discussion with learners. Where possible, to ensure fairness of assessment the size and complexity of the task should be the same for all learners. It is expected that, as a minimum, learners will provide evidence for one hand-held and one non-hand-held item of tool hire machinery and mechanisms, preferably those commonly used in the land-based industry sector that is the learners' primary interest area. Evidence may be in the same format as for P5.

For P8 and P9, learners must carry out, servicing, repairs and safety inspections of tool hire machinery and mechanisms. Tutors should identify the machines or agree them through discussion with learners. Where possible, to ensure fairness of assessment the size and complexity of the task should be the same for all learners. It is expected that, as a minimum, learners will provide evidence for the servicing, repair and safety inspection of one hand-held and one non-hand-held items of tool hire machinery and mechanisms, preferably those commonly used in the land-based industry sector that is the learners' primary interest area. Learners must consider the disposal of waste oils and used components in line with current environmental guidelines.

For P10 and P11, learners must carry out fault-finding and testing procedures on tool hire machinery and mechanisms and for P12 learners are required to report on their findings. Tutors should identify the machines or agree them through discussion with learners. Where possible, to ensure fairness of assessment the size and complexity of the task should be the same for all learners. It is expected that, as a minimum, learners will provide evidence for one hand-held and one non-hand-held items of tool hire machinery and mechanisms, preferably those commonly used in the land-based industry sector that is the learners' primary interest area. Evidence may be in the same format as for P8 and P9.

For M1, learners must compare the capabilities of hand-held and non-hand-held tool hire machinery and mechanisms to meet given objectives. Tutors should identify the machines or agree them through discussion with learners. Where possible, to ensure fairness of assessment the size and complexity of the task should be the same for all learners. It is expected that, as a minimum, learners will provide evidence for two hand-held and two non-hand-held items of tool hire machinery and mechanisms, preferably those commonly used in the land-based industry sector that is the learners' primary interest area. Evidence may be in the same format as for P1 and P2.

For M2, learners must produce a maintenance schedule for tool hire machinery and mechanisms. Tutors should identify the machines or agree them through discussion with learners. Where possible, to ensure fairness of assessment the size and complexity of the task should be the same for all learners. It is expected that, as a minimum, learners will provide evidence for two hand-held and two non-hand-held items of tool hire machinery and mechanisms, preferably those commonly used in the land-based industry sector that is the learners' primary interest area. Evidence may be in the same format as for P3 and P4.

For M3, learners must produce method statements for tool hire machinery and mechanisms. Tutors should identify the machines or agree them through discussion with learners. Where possible, to ensure fairness of assessment the size and complexity of the task should be the same for all learners. It is expected that, as a minimum, learners will provide evidence for two hand-held and two non-hand-held items of tool hire machinery and mechanisms, preferably those commonly used in the land-based industry sector that is the learners' primary interest area. Evidence may be in the same format as for P3 and P4.

For M4, learners must discuss legislation and regulations that apply to the use and testing of tool hire machinery and mechanisms. Tutors should identify the machines or agree them through discussion with learners. Where possible, to ensure fairness of assessment the size and complexity of the task should be the same for all learners.

For D1, learners must compare the maintenance requirements of pneumatic and hydraulic operating systems on tool hire machinery and mechanisms. Tutors should identify the machines or agree them through discussion with learners. Where possible, to ensure fairness of assessment the size and complexity of the task should be the same for all learners. Evidence could be in the form of a table or responses to by oral questioning or as a written assignment.

For D2, learners must evaluate a set of given wear limit figures and compare them against manufacturers' specifications. Tutors should identify the wear limit figures or agree these through discussion with learners. Where possible, to ensure fairness of assessment the size and complexity of the tasks should be the same for all learners. Evidence may be in the same format as for P8 and P9.

Programme of suggested assignments

The following table shows a programme of suggested assignments that cover the pass, merit and distinction criteria in the grading grid. This is for guidance and it is recommended that centres either write their own assignments or adapt any Edexcel assignments to meet local needs and resources.

Criteria covered	Assignment title	Scenario	Assessment method
P1, P2, M1	The Function and Operation of Tool Hire Machinery and Mechanisms	You are working for a local tool hire company, whilst working on the hire desk you need to understand the function and operation of hand-held and non-hand-held tool hire machinery and mechanisms.	Assignment/report. Presentation.
P3, P4, M2, D1	Understand the Maintenance Requirements of Tool Hire Machinery and Mechanisms	You are working for a local tool hire company, whilst working as a service technician need to understand the maintenance requirements of hand-held and non-hand-held tool hire machinery and mechanisms.	Assignment/report. Presentation.
P5, P6, P7 M3	Be able to Handover Tool Hire Machinery and Mechanisms	You are working for a local tool hire company, whilst working on the hire desk you will need to safely handover to the control of others hand-held and non-hand-held tool hire machinery and mechanisms.	Practical. Report/job card/work logs.
P8, P9, M4, D2	Be able to Carry out Maintenance and Inspection of Tool Hire Machinery and Mechanisms	You are working for a local tool hire company, whilst working as a service technician you will need to inspect repair and maintenance a range of hand-held and non-hand held tool hire machinery and mechanisms.	Practical Report/Job card/work logs.
P10, P11, P12	Be able to Carry out Fault Diagnosis and Repair to Tool Hire Machinery and Mechanisms	You are working for a local tool hire company, whilst working as a service technician you will need to carry out fault diagnosis and repair on tool hire machinery and mechanisms.	Practical. Report/Job card/work logs.

Links to National Occupational Standards, other BTEC units, other BTEC qualifications and other relevant units and qualifications

This unit forms part of the BTEC land-based sector suite. This unit has particular links with:

Level 2	Level 3
Land Based Engineering Operations – Understand how to Use, Service and Maintain Tools and Equipment	Inspect and Test Land-based Machinery and Equipment
LEO4 Core Land-based Engineering Principles – Mechanical Principles	
LEO5 Core Land-based Engineering Principles – Tools and Equipment	

Level 2	Level 3
LEO8 Core Land-based Engineering Principles – Servicing and Maintenance	

Essential resources

Learners will need access to a range of tool hire machinery and mechanisms to support their practical investigation. They will also need access to sufficient test and repair equipment and materials to enable accurate evaluation of machinery, assemblies and components.

Manufacturers' service manuals and test data will make a significant contribution to learner achievement. Tutors delivering this unit should be familiar with current hand-held and non-hand-held tool hire machinery and mechanisms.

Employer engagement and vocational contexts

Learners could be introduced to a variety of professionals from different companies and organisations to broaden their knowledge and make the learning experience interesting and contextualised. This could be through guest lectures, work placements or off-site visits to different establishments.

Indicative reading for learners

Textbook

Edwards D, Harris F and McCaffer R – *Management of Off-highway Plant and Equipment* (Routledge, 2003) ISBN 0415251281

Harris F – *Modern Construction and Ground Engineering Equipment and Methods, 2nd Edition* (Prentice Hall, 1994) ISBN 0582236576

Huzij R, Spano A, Bennett S – *Modern Diesel Technology: Heavy Equipment Systems* (Delmar Cengage Learning, 2006) ISBN 978-1-4180-0950-2

Nunney M J – *Light and Heavy Vehicle Technology, 4th Edition* (Butterworth-Heinemann Ltd, 1998) ISBN 0750680377

Websites

www.bagma.com

British Agricultural and Garden Machinery Association

www.defra.gov.uk

Department for Environment, Food and Rural Affairs

www.howstuffworks.com

HowStuffWorks

www.hse.gov.uk

Health and Safety Executive

www.iagre.org

Institution of Agricultural Engineers

www.lantra.co.uk

Lantra Sector Skills Council

Delivery of personal, learning and thinking skills (PLTS)

The following table identifies the PLTS opportunities that have been included within the assessment criteria of this unit:

Skill	When learners are ...
Independent enquirers	explaining the function of machinery assessing risk explaining principles of operation
Creative thinkers	explaining the function and specification of machinery assessing risk explaining principles of operation discussing the correct selection of machinery
Reflective learners	discussing the correct selection of machinery describing methods of fault diagnosis
Team workers	planning and carrying out maintenance and repair work diagnosing faults using a variety of sources
Self-managers	planning and carrying out maintenance and repair work diagnosing faults using a variety of sources
Effective participators	diagnosing faults using a variety of sources.

Although PLTS opportunities are identified within this unit as an inherent part of the assessment criteria, there are further opportunities to develop a range of PLTS through various approaches to teaching and learning.

Skill	When learners are ...
Independent enquirers	planning and carrying out research activities related to the unit evaluating and carrying out extended thinking
Creative thinkers	asking questions to extend their thinking during lectures and practical sessions adapting ideas as circumstances change eg fault diagnosis on a variety of machinery
Reflective learners	identifying opportunities for their own achievements setting goals for themselves eg time management reviewing progress in practical tasks and coursework
Team workers	working with others to carry out repair and maintenance tasks reaching clear agreements regarding who is carrying out which tasks during practical activities working together when diagnosing faults
Self-managers	dealing with pressures in an emergency situation managing time and resources during practical activities
Effective participators	discussing issues of concern relating to time management and resources during practical activities identifying improvements that could be implemented during practical tasks.

● Functional Skills – Level 2

Skill	When learners are ...
ICT – Use ICT systems	
Select, interact with and use ICT systems independently for a complex task to meet a variety of needs	completing their course work using ICT facilities using interactive materials for teaching and learning researching subjects on the internet
Use ICT to effectively plan work and evaluate the effectiveness of the ICT system they have used	
Manage information storage to enable efficient retrieval	
Follow and understand the need for safety and security practices	
Troubleshoot	
ICT – Find and select information	
Select and use a variety of sources of information independently for a complex task	
Access, search for, select and use ICT-based information and evaluate its fitness for purpose	
ICT – Develop, present and communicate information	
Enter, develop and format information independently to suit its meaning and purpose including: <ul style="list-style-type: none"> ● text and tables ● images ● numbers ● records 	
Bring together information to suit content and purpose	
Present information in ways that are fit for purpose and audience	
Evaluate the selection and use of ICT tools and facilities used to present information	
Select and use ICT to communicate and exchange information safely, responsibly and effectively including storage of messages and contact lists	

Skill	When learners are ...
Mathematics	
Understand routine and non-routine problems in a wide range of familiar and unfamiliar contexts and situations	planning an activity and getting relevant information from relevant sources
Identify the situation or problem and the mathematical methods needed to tackle it	using this information to carry out multi-stage calculations to do with, amounts or sizes, scales or proportion and using formulae
Select and apply a range of skills to find solutions	interpreting the results of calculations, presenting findings and justifying methods
Use appropriate checking procedures and evaluate their effectiveness at each stage	
Interpret and communicate solutions to practical problems in familiar and unfamiliar routine contexts and situations	
Draw conclusions and provide mathematical justifications	
English	
Speaking and listening – make a range of contributions to discussions and make effective presentations in a wide range of contexts	reading material on the subject from a variety of sources for their assignment work
Reading – compare, select, read and understand texts and use them to gather information, ideas, arguments and opinions	reading around subjects and producing clear and concise documents using correct engineering terminology
Writing – write documents, including extended writing pieces, communicating information, ideas and opinions, effectively and persuasively	presenting information to a group of people ideally in a classroom situation with their peers.