



INSTITUTE
OF THE MOTOR
INDUSTRY

IMI QUALIFICATION



Assessment Record for

IMI Level 2 Diploma in Lift Truck Maintenance and Repair Competence

I.D: 600/0440/X

*To be used in conjunction with Learner Guidance, Candidate
Assessment Summary, Practical Assessments and Written
Assessments (optional)*

*For assessor use only: Teaching Programmes, Assessor Verifier
Guidance*

CENTRE INFORMATION

Please be aware that any **legislation** referred to in this qualification may be subject to amendment/s during the life of this qualification. Therefore IMI Approved Centres must ensure they are aware of and comply with any amendments, e.g. to health and safety legislation and employment practices.

Please be aware that **vehicle technologies** referred to in this qualification reflect current practice, but may be subject to amendment/s, updates and replacements during the life of this qualification. Therefore IMI Approved Centres must ensure they are aware of the latest developments and emerging technologies to ensure the currency of this qualification.

Please note: the relevance of the information contained in the **unit content** will vary depending upon the vehicle types being worked upon. The unit content is for guidance only and is not meant to be prescriptive.

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Requests should be made in writing and addressed to:
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Fanshaws, Brickendon, Hertford SG13 8PQ



CONTACT SHEET

Learner Name:	
Learner Registration No:	
Learner Address:	
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Employer Contact:	
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Please complete as appropriate:	
Witness Name:	Witness Name:
Witness Job Title:	Witness Job Title:
Witness Signature:	Witness Signature:
Witness Name:	Witness Name:
Witness Job Title:	Witness Job Title:
Witness Signature:	Witness Signature:
Assessor Name:	Assessor Name:
Assessor Signature:	Assessor Signature:
Assessor Name:	
Assessor Signature:	
Internal Verifier Name:	Internal Verifier Name:
Internal Verifier Signature:	Internal Verifier Signature:



IMI Level 2 Diploma in Lift Truck Maintenance and Repair Competence (VCQ)

This qualification consists of 6 Mandatory Units, 11 Mandatory Specialist Units and 10 Optional Units.

All units are either Competency (C), Skills (S) or Knowledge (K) Units. The C, K or S units are combined to form a topic 'set'

In order to pass the qualification, learners must achieve a minimum of 103 credits from the following groups:

Group A: 29 Credits from 6 Mandatory Units.

Group B: 64 credits from 11 Mandatory Specialist Units

Group C: 10 credits from the Optional Units

Please note that every knowledge unit has an online test and the test number is the same as the 'set ref'.

Group A: Mandatory Units

Set Ref:	Unit Ref, Unit Title & I.D. Number	GLH	Unit Level	Credit Value
G0102	G0102C - Competency in Health, Safety and Good Housekeeping in the Automotive Environment (A/601/6338)	60	2	7
	G0102K - Knowledge of Health, Safety and Good Housekeeping in the Automotive Environment (D/601/6171)	30	2	3
G3	G3C - Competency in Supporting Job Roles in the Automotive Environment (K/601/6366)	40	3	5
	G3K - Knowledge of Support for Job Roles in the Automotive Environment (T/601/6175)	20	3	3
G4	G4K - Knowledge of Materials, Fabrication, Tools and Measuring Devices used in the Automotive Environment (K/601/6237)	40	2	4
	G4S - Skills in Materials, Fabrication, Tools and Measuring Devices used in the Automotive Environment (Y/601/6279)	60	2	7



Group B: Mandatory Specialist Units

Set Ref:	Unit Ref, Unit Title & I.D. Number	GLH	Unit Level	Credit Value
LT01	LT01C – Competency in Routine Lift Truck Maintenance (D/602/6411)	60	2	7
	LT01K – Knowledge of Routine Lift Truck Vehicle Maintenance (H/602/6426)	20	2	2
LT02.1	LT02.1K - Knowledge of Lift Truck Power Plant, Lubrication and Cooling System Units and Components (K/602/6427)	20	2	3
LT02.2	LT02.2K - Knowledge of Lift Truck Fuel, Ignition, Air and Exhaust System Units and Components (M/602/6428)	20	2	3
LT02	LT02C – Competency in Removing and Replacing Lift Truck Power Plants Units and Components (H/602/6412)	90	2	10
LT03	LT03C – Competency in Removing and Replacing Lift Truck Electrical Units and Components (M/602/6414)	90	2	10
	LT03K - Knowledge of Removing and Replacing Lift Truck Electrical Units and Components (K/602/6430)	45	2	6
LT04	LT04C - Competency of Removing and Replacing Lift Truck Mechanical Handling, Chassis Units and Components (A/602/6416)	90	2	10
	LT04K - Knowledge of Removing and Replacing Lift Truck Mechanical Handling, Chassis Units and Components (F/602/6434)	45	2	6
LT0506	LT0506K - Knowledge of Inspecting Lift Trucks (R/602/6437)	20	2	3
LT05	LT05C – Competency in Inspecting Lift Truck Using Prescribed Methods (J/602/6418))	30	2	4

GROUP C: Optional Units

Set Ref:	Unit Ref, Unit Title & I.D. Number	GLH	Unit Level	Credit Value
G8	G8C – Competency in Identifying and Agreeing Motor Vehicle Customer Service Needs (K/601/6383)	40	3	5
	G8K – Knowledge of How to Identify and Agree Motor Vehicle Customer Service Needs (R/601/6247)	45	3	5
LT12	LT12C – Competency in Removing and Replacing Lift Truck Driveline Units and Components (L/602/6422)	90	2	10
	LT12K - Knowledge of Removing and Replacing Lift Truck Driveline Units and Components (J/602/6435)	45	2	6



Learner Name:

UNIT REF: G0102C	UNIT TITLE: COMPETENCY IN HEALTH, SAFETY AND GOOD HOUSEKEEPING IN THE AUTOMOTIVE ENVIRONMENT
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Level: 2	Route: Competence	Credit Value: 7	GLH: 60
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Mapping: This unit is mapped to the IMI NOS G1 and G2

Rationale: This unit will enable the learner to develop competency in order to carry out day to day work area cleaning, clearing away, dealing with spillages and disposal of waste, used materials and debris. Identify hazards and risks in the automotive environment and complying with relevant legislation and good practice and work safely at all times within the automotive environment, both as an individual and with others.

LEARNING OUTCOMES	ASSESSMENT CRITERIA	Ref No	Date
The Learner will:	The Learner can:		
1. Be able to use correct personal and vehicle protection within the automotive environment	1.1. Select and use personal protective equipment throughout activities. To include appropriate protection of: <ul style="list-style-type: none"> a eyes b ears c head d skin e feet f hands g lungs 1.2. Select and use vehicle protective equipment throughout all activities.		
2. Be able to carry out effective housekeeping practices in the automotive environment	2.1. Select and use cleaning equipment which is of the right type and suitable for the task. 2.2. Use utilities and appropriate consumables, avoiding waste 2.3. Use materials and equipment to carry out cleaning and maintenance duties in allocated work areas, following automotive work environment policies, schedules and manufacturers instructions 2.4. Perform housekeeping activities safely and in a way which minimises inconvenience to customers and staff. 2.5. Keep the work area clean and free from debris and waste materials. 2.6. Keep tools and equipment fit for purpose by regular cleaning and keeping tidy 2.7. Dispose of used cleaning agents, waste materials and debris to comply with legal and workplace requirements.		



Learner Name:

3. Be able to recognise and deal with dangers in order to work safely within the automotive workplace	3.1. Name and locate the responsible persons for health and safety in their relevant workplace 3.2. Identify and report working practices and hazards which could be harmful to themselves or others 3.3. Carry out safe working practices whilst working with equipment, materials and products in the automotive environment 3.4. Rectify health and safety risks encountered at work, within the scope and capability of their job role		
4. Be able to conduct themselves responsibly	4.1. Show personal conduct in the workplace which does not endanger the health and safety of themselves or others 4.2. Display suitable personal presentation at work which ensures the health and safety of themselves and others at work		

ASSESSOR SIGNATURE:	PIN NO:	DATE:
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EVIDENCE REQUIREMENTS

1. You must produce evidence of use of personal and vehicle protection, cleaning the work environment and disposal of waste on 3 separate occasions .	Evidence Ref:	
2. You must be observed by your assessor on at least 1 occasion carrying out the above.	Observation Ref:	
3. You must produce evidence of identifying risks which may result from at least 2 of the items listed below:	Evidence Ref:	
the use and maintenance of machinery or equipment		
the use of materials or substances		
working practices which do not conform to laid down policies		
unsafe behaviour		
accidental breakages and spillages		
environmental factors		
4. You must be observed by your assessor on at least 1 occasion carrying out the above.	Observation Ref	
5. You must produce evidence of following at least 4 of the workplace policies listed below:	Evidence Ref	
the use of safe working methods and equipment		
the safe use of hazardous substances		
smoking, eating, drinking and drugs		
what to do in the event of an emergency		
personal presentation		
6. You must be observed by your assessor following workplace policies on at least 1 occasion	Observation Ref	

ASSESSOR SIGNATURE:	PIN NO:	DATE:
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UNIT REF: G0102K	UNIT TITLE: KNOWLEDGE OF HEALTH, SAFETY AND GOOD HOUSEKEEPING IN THE AUTOMOTIVE ENVIRONMENT
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Level: 2	Route: Knowledge	Credit Value: 3	GLH: 30
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Mapping: This unit is mapped to the IMI NOS G1 and G2

Rationale: This unit enables the learner to develop an understanding of routine maintenance and cleaning of the automotive environment and using resources economically and health and safety legislation and duties of everyone in the motor vehicle environment. It will provide an appreciation of significant risks in the automotive environment and how to identify and deal with them. Once completed the learner will be able to identify hazards and evaluate and reduce risk.

LEARNING OUTCOMES	ASSESSMENT CRITERIA
The Learner will:	The Learner can:
1. Understand the correct personal and vehicle protective equipment to be used within the automotive environment	1.1. Explain the importance of wearing the types of PPE required for a range automotive repair activities 1.2. Identify vehicle protective equipment for a range of repair activities 1.3. Describe vehicle and personal safety considerations when working at the roadside
2. Understand effective housekeeping practices in the automotive environment	2.1. Describe why the automotive environment should be properly cleaned and maintained. 2.2. Describe requirements and systems which may be put in place to ensure a clean automotive environment. 2.3. Describe how to minimise waste when using utilities and consumables 2.4. State the procedures and precautions necessary when cleaning and maintaining an automotive environment. 2.5. Describe the selection and use of cleaning equipment when dealing with general cleaning, spillages and leaks in the automotive environment. 2.6. Describe procedures for correct disposal of waste materials from an automotive environment 2.7. Describe procedures for starting and ending the working day which ensure effective housekeeping practices are followed

<p>3. Understand key health and safety requirements relevant to the automotive environment</p>	<p>3.1. List the main legislation relating to automotive environment health and safety.</p> <p>3.2. Describe the general legal duties of employers and employees required by current health and safety legislation</p> <p>3.3. Describe key, current health and safety requirements relating to the automotive environment.</p> <p>3.4. Describe why workplace policies and procedures relating to health and safety are important</p>
<p>4. Understand about hazards and potential risks relevant to the automotive environment</p>	<p>4.1. Identify key hazards and risks in an automotive environment</p> <p>4.2. Describe policies and procedures for reporting hazards, risks, health and safety matters in the automotive environment.</p> <p>4.3. State precautions and procedures which need to be taken when working with vehicles, associated materials, tools and equipment.</p> <p>4.4. Identify fire extinguishers in common use and which types of fire they should be used on</p> <p>4.5. Identify key warning signs and their characteristics that are found in the vehicle repair environment.</p> <p>4.6. State the meaning of common product warning labels used in an automotive environment.</p>
<p>5. Understand personal responsibilities</p>	<p>5.1. Explain the importance of personal conduct in maintaining the health and safety of the individual and others</p> <p>5.2. Explain the importance of personal presentation in maintaining health safety and welfare</p>

Content:
Economic use of resources

- a. Consumable materials e.g. grease, oils, split pins, locking and fastening devices etc.

Requirement to maintain work area effectively

- a. Cleaning tools and equipment to maximise workplace efficiency.
- b. Requirement to carry out the housekeeping activities safely and in a way that minimises inconvenience to customers and staff.
- c. Risks involved when using solvents and detergents.
- d. Advantages of good housekeeping.

Spillages, leaks and waste materials

- a. Relevance of safe systems of work to the storage and disposal of waste materials.
- b. Requirement to store and dispose of waste, used materials and debris correctly.
- c. Safe disposal of special / hazardous waste materials.
- d. Advantages of recycling waste materials.
- e. Dealing with spillages and leaks

Basic legislative requirements

- a. Provision and Use of Work Equipment Regulations 1992.
- b. Power Presses Regulations 1992.
- c. Pressure Systems and Transportable Gas Containers Regulations 1989.
- d. Electricity at Work Regulations 1989.
- e. Noise at Work Regulations 1989.
- f. Manual Handling Operations Regulations 1992.
- g. Health and Safety (Display Screen Equipment) Regulations 1992.
- h. Abrasive Wheel Regulations.
- i. Safe Working Loads.
- j. Working at Height Regulations (2005)

Routine maintenance of the workplace

- a. Trainee's personal responsibilities and limits of their authority with regard to work equipment.
- b. Risk assessment of the workplace activities and work equipment.
- c. Workplace person responsible for training and maintenance of workplace equipment.
- d. When and why safety equipment must be used.
- e. Location of safety equipment.
- f. Particular hazards associated with their work area and equipment.
- g. Prohibited areas.
- h. Plant and machinery that trainees must not use or operate.
- i. Why and how faults on unsafe equipment should be reported.
- j. Storing tools, equipment and products safely and appropriately.
- k. Using the correct PPE.
- l. Following manufacturer's recommendations.
- m. Location of routine maintenance information e.g. electrical safety check log.

Legislation relevant to Health and Safety

- a. HASAWA
- b. COSHH
- c. EPA
- d. Manual Handling Operations Regulations 1992
- e. PPE Regulations 1992

Content: Contd
General regulations to include an awareness of:

- a Health and Safety (Display Screen Equipment) Regulations 1992
- b Health and Safety (First Aid) Regulations 1981
- c Health and Safety (Safety Signs and Signals) Regulations 1996
- d Health and Safety (Consultation with Employees) Regulations 1996
- e Employers Liability (Compulsory Insurance) Act 1969 and Regulations 1998
- f Confined Spaces Regulations 1997
- g Noise at Work Regulations 1989
- h Electricity at Work Regulations 1989
- i Electricity (Safety) Regulations 1994
- j Fire Precautions Act 1971
- k Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 1985
- l Pressure Systems Safety Regulations 2000
- m Waste Management 1991
- n Dangerous Substances and Explosive Atmospheres Regulations (DSEAR) 2002
- o Control of Asbestos at Work Regulations 2002
- p PUWER
- q LOLER

Legislative duties:

- a. The purpose of a Health and Safety Policy.
- b. The relevance of the Health and Safety Executive.
- c. The relevance of an initial induction to Health and Safety requirements at your workplace.
- d. General employee responsibilities under the HASAWA and the consequences of non-compliance.
- e. General employer responsibilities under the HASAWA and the consequences of non-compliance.
- f. The limits of authority with regard to Health and Safety within a personal job role.
- g. Workplace procedure to be followed to report Health and Safety matters.

Precautions to be taken when working with lift trucks, workshop materials, tools and equipment including electrical safety, pneumatics and hydraulics

- a. Accessing and interpreting safety information
- b. Seeking advice when needed
- c. Seeking assistance when required
- d. Reporting of unsafe equipment
- e. Storing tools, equipment and products safely and appropriately
- f. Using the correct PPE
- g. Following manufacturers recommendations
- h. Following application procedures e.g. hazardous substances
- i. The correct selection and use of extraction equipment

Content: Contd
PPE to include:

- a. Typical maintenance procedures for PPE equipment to include:
 - i. typical maintenance log
 - ii. cleaning procedures
 - iii. filter maintenance
 - iv. variation in glove types
 - v. air quality checks
- b. Choice and fitting procedures for masks and air breathing equipment.
- c. Typical workplace processes which would require the use of PPE to include:
 - i. welding
 - ii. sanding and grinding
 - iii. filling
 - iv. panel removal and replacement
 - v. drilling
 - vi. cutting
 - vii. chiselling
 - viii. removal of broken glass
 - ix. removal of rubber seals from fire damaged lift trucks
 - x. removal of hypodermic needles
 - xi. servicing activities
 - xii. roadside recovery
- d. Unserviceable PPE.
- e. PPE required for a range automotive repair activities. To include appropriate protection of:
 - i. eyes
 - ii. ears
 - iii. head
 - iv. skin
 - v. feet
 - vi. hands
 - vii. lungs

Fire and extinguishers

- a. Classification of fire types
- b. Using a fire extinguisher effectively.
- c. Types of Extinguishers
 - i. foam
 - ii. dry powder
 - iii. CO2
 - iv. water
 - v. fire blanket

Action to be taken in the event of a fire to include:

- a. The procedure as:
 - i. raise the alarm
 - ii. fight fire only if appropriate
 - iii. evacuate building
 - iv. call for assistance

Product warning labels to include:

- a. Reasons for placing warning labels on containers.
- b. Warning labels in common use, to include:
 - i. toxic
 - ii. corrosive
 - iii. poisonous
 - iv. harmful
 - v. irritant
 - vi. flammable
 - vii. explosive

Content: contd
Warning signs and notices

- a. Colours used for warning signs:
 - i. red
 - ii. blue
 - iii. green
- b. Shapes and meaning of warning signs:
 - i. round
 - ii. triangular
 - iii. square
- c. The meaning of prohibitive warning signs in common use.
- d. The meaning of mandatory warning signs in common use.
- e. The meaning of warning notices in common use.
- f. General design of safe place warning signs.

Hazards and risks to include:

- a. The difference between a risk and a hazard.
- b. Potential risks resulting from:
 - i. the use and maintenance of machinery or equipment
 - ii. the use of materials or substances
 - iii. accidental breakages and spillages
 - iv. unsafe behaviour
 - v. working practices that do not conform to laid down policies
 - vi. environmental factors
 - vii. personal presentation
 - viii. unauthorised personal, customers, contractors etc entering your work premises
 - ix. working by the roadside
 - x. lift truck recovery
- c. The employee's responsibilities in identifying and reporting risks within their working environment.
- d. The method of reporting risks that are outside your limits of authority.
- e. Potential causes of:
 - i. fire
 - ii. explosion
 - iii. noise
 - iv. harmful fumes
 - v. slips
 - vi. trips
 - vii. falling objects
 - viii. accidents whilst dealing with broken down lift trucks

Personal responsibilities

- a. The purpose of workplace policies and procedures on:
 - i. the use of safe working methods and equipment
 - ii. the safe use of hazardous substances
 - iii. smoking, eating, drinking and drugs
 - iv. emergency procedures
 - v. personal appearance
- b. The importance of personal appearance in the control of health and safety.

Content: contd
Action to be taken in the event of colleagues suffering accidents

- a. The typical sequence of events following the discovery of an accident such as:
 - i. make the area safe
 - ii. remove hazards if appropriate i.e. switch off power
 - iii. administer minor first aid
 - iv. take appropriate action to re-assure the injured party
 - v. raise the alarm
 - vi. get help
 - vii. report on the accident

- b. Typical examples of first aid which can be administered by persons at the scene of an accident:
 - i. check for consciousness
 - ii. stem bleeding
 - iii. keep the injured person's airways free
 - iv. place in the recovery position if injured person is unconscious
 - v. issue plasters for minor cuts
 - vi. action to prevent shock i.e. keep the injured party warm
 - vii. administer water for minor burns or chemical injuries
 - viii. wash eyes with water to remove dust or ingress of chemicals (battery acid)
 - ix. need to seek professional help for serious injuries

- c. Examples of bad practice which may result in further injury such as:
 - i. moving the injured party
 - ii. removing foreign objects from wounds or eyes
 - iii. inducing vomiting
 - iv. straightening deformed limbs



Learner Name:

UNIT REF: G3C	UNIT TITLE: COMPETENCY IN SUPPORTING JOB ROLES IN THE AUTOMOTIVE WORK ENVIRONMENT
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Level: 3	Route: Competence	Credit Value: 5	GLH: 40
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Mapping: This unit is mapped to the IMI NOS G3

Rationale: This unit will help the learner develop competency in order to keep good working relationships with all colleagues and customers in the automotive work environment by using effective communication and support.

LEARNING OUTCOMES	ASSESSMENT CRITERIA	Ref No	Date
The Learner will:	The Learner can:		
1. Be able to work effectively within the organisational structure of the automotive work environment	1.1. Respond promptly and willingly to requests for assistance from customers and colleagues 1.2. Refer customers and colleagues to the correct person should requests fall outside their responsibility and capability		
2. Be able to obtain and use information in order to support their job role within the automotive work environment	2.1. Select and use legal and manufacturers information, in an automotive work environment.		
3. Be able to communicate with and support colleagues and customers effectively within the automotive work environment	3.1. Use methods of communication with customers and colleagues which meet their needs 3.2. Give customers and colleagues accurate information 3.3. Make requests for assistance from or to customers and colleagues clearly and courteously 3.4. Report any anticipated delays in completion to the relevant persons promptly.		
4. Be able to develop and keep good working relationships in the automotive work environment	4.1. Contribute to team work by initiating ideas and co-operating with customers and colleagues 4.2. Treat customers and colleagues in a way which shows respect for their views and opinions 4.3. Make and keep achievable commitments to customers and colleagues 4.4. Inform colleagues promptly of anything likely to affect their own work		



EVIDENCE REQUIREMENTS

1. You must be observed by your assessor on at least 3 occasions carrying out the above whilst performing your normal work duties.	Observation Ref:		

ASSESSOR SIGNATURE:	PIN NO:	DATE:
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UNIT REF: G3K	UNIT TITLE: KNOWLEDGE OF SUPPORT FOR JOB ROLES IN THE AUTOMOTIVE WORK ENVIRONMENT
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Level: 3	Route: Knowledge	Credit Value: 3	GLH: 20
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Mapping: This unit is mapped to the IMI NOS G3

Rationale: This unit enables the learner to develop an understanding of how to keep good working relationships with all colleagues in the automotive work environment by using effective communication and support skills.

LEARNING OUTCOMES	ASSESSMENT CRITERIA
The Learner will:	The Learner can:
1. Understand key organisational structures, functions and roles within the automotive work environment	1.1. Identify the purpose of different sections of a typical automotive work environment 1.2. Explain organisational structures and lines of communication within the automotive work environment 1.3. Explain levels of responsibility within specific job roles in automotive workplace. To include: <ul style="list-style-type: none"> a. trainee b. skilled technician c. supervisor d. manager
2. Understand the importance of obtaining, interpreting and using information in order to support their job role within the automotive work environment	2.1. Explain the importance of different sources of information in a automotive work environment. 2.2. Explain how to find, interpret and use relevant sources of information 2.3. Describe the main legal requirements relating to the vehicle, including road safety requirements 2.4. Explain the importance of working to recognised procedures and processes 2.5. Explain when replacement units and components must meet the manufacturers' original equipment specification. 2.6. Explain the purpose of how to use identification codes
3. Understand the importance of different types of communication within the automotive work environment	3.1. Explain where different methods of communication would be used within the automotive environment 3.2. Explain the factors which can determine your choice of communication. 3.3. Explain how the communication of information can change with the target audience to include uninformed and informed people



4. Understand communication requirements when carrying out vehicle repairs in the automotive work environment	4.1. Explain how to report using written and verbal communication. 4.2. Explain the importance of documenting information relating to work carried out in the automotive environment 4.3. Explain the importance of working to agreed timescales
5. Understand how to develop good working relationships with colleagues and customers in the automotive workplace	5.1. Describe how to develop positive working relationships with colleagues and customers 5.2. Explain the importance of developing positive working relationships 5.3. Explain the importance of accepting other peoples' views and opinions. 5.4. Explain the importance of making and honouring realistic commitments to colleagues and customers.

Content:**The structure of a typical vehicle/lift truck repair business**

- a. How these areas relate to each other within the business
 - i. body shop
 - ii. lift truck repair workshop
 - iii. paint shop
 - iv. valeting
 - v. lift truck parts supply
 - vi. main office
 - vii. lift truck sales
 - viii. reception/call centres
- b. Sources of information
 - i. other staff
 - ii. manuals
 - iii. parts lists
 - iv. computer software and the internet
 - v. manufacturer
 - vi. diagnostic equipment

Communication requirements when carrying out lift truck repairs

- a. Locating and using correct documentation and information for:
 - i. recording lift truck maintenance and repairs
 - ii. lift truck specifications
 - iii. component specifications
 - iv. oil and fluid specifications
 - v. equipment and tools
 - vi. identification codes
- b. Procedures for:
 - i. referral of problems
 - ii. reporting delays
 - iii. additional work identified during repair or maintenance
 - iv. keeping others informed of progress

Content: contd**Methods of communication**

- a. Verbal
- b. Signs and notices
- c. Memos
- d. Telephone
- e. Electronic mail
- f. Lift Truck job card
- g. Notice boards
- h. SMS text messaging
- i. Letters

Organisational & customer requirements:

- a. Importance of time scales to customer and organisation
- b. Relationship between time and costs
- c. Meaning of profit

Choice of communication

- a. Distance
- b. Location
- c. Job responsibility

Importance of maintaining positive working relationships:

- a. Morale
- b. Productivity
- c. Company image
- d. Customer relationships
- e. Colleagues



UNIT REF: G4K	UNIT TITLE: KNOWLEDGE OF MATERIALS, FABRICATION, TOOLS AND MEASURING DEVICES USED IN THE AUTOMOTIVE ENVIRONMENT
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Level: 2	Route: Knowledge	Credit Value: 4	GLH: 40
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Mapping: This unit is mapped to the IMI NOS G4

Rationale: This unit enables the learner to develop an understanding of the correct selection, care and use of key hand tools and measuring devices for modification, fabrication and repair in the automotive environment, the correct preparation and use of common automotive environment equipment, the correct selection and fabrication of materials used when modifying and repairing and the correct application of automotive engineering fabrication and fitting principles

LEARNING OUTCOMES	ASSESSMENT CRITERIA
The Learner will:	The Learner can:
1. Understand how to select, use and care for hand tools and measuring devices in the automotive environment	1.1. Identify and explain the use of common types of hand tools used for fabricating and fitting in the automotive environment 1.2. Identify and explain the use of common measuring devices used for fabrication and fitting in the automotive environment 1.3. Describe, within the scope of their responsibilities, how to select, prepare and maintain hand tools, measuring devices and PPE used for fabrication, repair and fitting in the automotive environment 1.4. State the limitations of common hand tools and measuring devices used for fabricating, repair and fitting in the automotive workplace 1.5. Explain how common hand tools and measuring devices used for fabricating, repair and fitting in the automotive environment should be stored and maintained 1.6. Identify common electrical measuring tools used in the repair of vehicles and components 1.7. Explain the preparation and safe and correct use of common electrical tools when measuring voltage, current and resistance
2. Understand how to prepare and use common workshop equipment	2.1. Describe the preparation and safe use of workshop equipment 2.2. Explain the term: safe working load



<p>3. Understand how to select materials when fabricating, modifying and repairing vehicles and fitting components</p>	<p>3.1. Describe the properties, application and limitations of ferrous and non-ferrous metals, including their safe use.</p> <p>3.2. Describe the properties, application and limitations of common non-metallic materials, including their safe use</p> <p>3.3. Define common terms relating to the properties of materials</p>
<p>4. Understand how to apply automotive engineering, fabrication and fitting principles when modifying and repairing vehicles and components</p>	<p>4.1. Describe how to tap threads, file, cut and drill plastics and metals when modifying or repairing vehicles</p> <p>4.2. Describe how to measure, mark out, shape and join materials when fabricating</p> <p>4.3. Describe the selection and fitting procedures of the following:</p> <ul style="list-style-type: none">a. gaskets and sealsb. sealants and adhesivesc. fittings and fastenersd. electrical circuit components <p>4.4. Identify locking, fastening and fixing devices</p> <p>4.5. State the importance of correct operating specifications for limits, fits and tolerances in the automotive environment</p>



UNIT REF: G4S	UNIT TITLE: SKILLS IN MATERIALS, FABRICATION, TOOLS AND MEASURING DEVICES USED IN THE AUTOMOTIVE ENVIRONMENT
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Level: 2	Route: Skills	Credit Value: 7	GLH: 60
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Mapping: This unit is mapped to the IMI NOS G4

Rationale: This unit helps the learner to develop the skills required for the correct selection, care and use of key hand tools and measuring devices for modification, fabrication and repair in the automotive environment. The correct preparation and use of common work environment equipment. The correct selection and fabrication of materials used when modifying and repairing and the correct application of automotive engineering fabrication and fitting principle

LEARNING OUTCOMES	ASSESSMENT CRITERIA	Ref No	Date
The Learner will:	The Learner can:		
1. Be able to select, maintain and use hand tools and measuring devices in the automotive environment	1.1. Select, maintain and use suitable hand tools safely when fabricating and fitting in the automotive workplace 1.2. Select, maintain and use suitable measuring devices safely when fabricating and fitting in the automotive environment 1.3. Select, maintain and use suitable PPE for fabrication, repair and fitting in the automotive environment. 1.4. Select, maintain and use suitable electrical measuring tools safely when repairing vehicles and components		
2. Be able to prepare and use common workshop equipment	2.1. Use suitably maintained workshop equipment safely 2.2. Use correct interpretation of 'safe working load' on lifting and supporting equipment. 2.3. Report any faulty or damaged tools and equipment to the relevant persons clearly and promptly. 2.4. Store work tools and equipment in a safe manner which permits ease of access and identification for use.		
3. Be able to select materials when fabricating, modifying and repairing vehicles and fitting components	3.1. Select and use appropriate materials whilst constructing, fitting, modifying or repairing vehicles and components.		
4. Be able to apply automotive engineering, fabrication and fitting principles when modifying and repairing vehicles and components	4.1. Use correct procedures when: <ul style="list-style-type: none"> a. filing, b. tapping threads c. cutting plastics and metals d. drilling plastics and metals. e. fitting 4.2. Use appropriate techniques when fabricating, repairing and modifying vehicles and components 4.3. Select and use: <ul style="list-style-type: none"> a. gaskets b. seals c. sealants d. fittings and fasteners 4.4. Apply modification and repair techniques to automotive electrical circuits 4.5. Select and use locking, fixing and fastening devices		

EVIDENCE REQUIREMENTS

1.	You must produce evidence of undertaking basic routine checks of hand tools, measuring devices and workshop equipment covering all of those listed below:
	• electrical
	• mechanical
	• pneumatic
	• hydraulic
2.	You must produce evidence of fabricating at least 1 item from suitable materials to known tolerances, which includes the following processes
	• filing
	• tapping threads
	• cutting
	• drilling
	• joining
3.	You must be observed by your assessor carrying out routine checks and during stages of fabrication



Learner Name:

UNIT REF: LT01C	UNIT TITLE: COMPETENCY IN ROUTINE LIFT TRUCK MAINTENANCE
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Level: 2	Route: Competence	Credit Value: 7	GLH: 60
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Mapping: This unit is mapped to LT01

Rationale:
 This unit allows the learner to develop the skills they need to can carry out lift truck routine maintenance, adjustments and replacement activities as part of the periodic servicing.

LEARNING OUTCOMES	ASSESSMENT CRITERIA	Ref No	Date
The Learner will:	The Learner can:		
1. Be able to work safely when carrying out lift truck routine maintenance	1.1. Wear suitable personal protective equipment and use suitable coverings throughout all lift truck routine maintenance activities 1.2. Work in a way which minimises the risk of damage or injury to the lift truck, people and the environment		
2. Be able to use relevant information to carry out the task	2.1. Select suitable sources of technical information to support lift truck routine maintenance activities including: a. technical data b. maintenance procedures c. legal requirements 2.2. interpret technical information to support lift truck inspection activities		
3. Be able to use appropriate tools and equipment	3.1. Select the appropriate tools and equipment necessary for carrying out routine maintenance 3.2. Ensure that equipment has been calibrated to meet manufacturers' and legal requirements 3.3. Use the correct tools and equipment in the way specified by manufacturers when carrying out routine maintenance		
4. Be able to carry out lift truck routine maintenance	4.1. Carry out lift truck inspections using prescribed methods, adhering to the correct specifications and tolerances for the vehicle and following: a. the manufacturer's approved inspection methods b. recognised researched inspection methods c. health and safety requirements 4.2. Carry out adjustments, replacement of components and replenishment of consumable materials following the manufacturer's current specification for: a. the particular maintenance interval b. working methods and procedures c. use of equipment d. the tolerances relevant to the lift truck 4.3. Ensure the examination methods identify accurately any lift truck system and or component problems falling outside the maintenance schedule are specified. 4.4. Ensure that inspected lift truck conforms to the operating specification and any legal requirements 4.5. Ensure any comparison of the lift truck systems against		



	<p>specification accurately identifies any: a. differences from the specification b. faults</p> <p>4.6. Use suitable testing methods to evaluate the performance of all replaced and adjusted components and systems accurately</p> <p>4.7. Work to the specified timescale for the activity</p>		
5. Be able to record information and make suitable recommendations	<p>5.1. Produce work records that are accurate, complete and passed to the relevant person(s) promptly in the format required</p> <p>5.2. Make suitable and justifiable recommendations for cost effective repairs</p> <p>5.3. Identify and report any expected delays in completion to the relevant person(s) promptly in the format required.</p> <p>5.4. Record and report any additional faults noticed during the course of their work promptly in the format required</p>		

EVIDENCE REQUIREMENTS

1. You must produce evidence from your normal workplace of carrying out servicing activities on at least 3 different lift trucks	Evidence Ref:
2. You must be observed by your assessor carrying out a range of servicing activities on at least 1 occasion	Observation Ref:

Evidence from simulated activities is **not** acceptable for this unit

ASSESSOR SIGNATURE:	PIN NO:	DATE:
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UNIT REF: LT01K	UNIT TITLE: KNOWLEDGE OF ROUTINE LIFT TRUCK MAINTENANCE
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Level: 2	Route: Knowledge	Credit Value: 2	GLH: 20
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Mapping: This unit is mapped to the IMI NOS LT01

Rationale:
 This unit enables the learner to develop an understanding of lift trucks and conducting routine maintenance, adjustment and replacement activities as part of the periodic servicing of lift trucks

LEARNING OUTCOMES	ASSESSMENT CRITERIA
The Learner will:	The Learner can:
1. Understand the different types of fork lift truck that may be encountered in a maintenance environment.	1.1. Identify different types of power units including diesel, liquid petroleum gas (LPG) and electric 1.2. Identify the different types of lift truck
2. Understand how to carry out routine lift truck maintenance	2.1. Describe how to conduct a scheduled lift truck routine examination and assessment against the manufactures specification 2.2. Identify the assessment methods used to check for conformity 2.3. Identify the different systems to be inspected while carrying out lift truck routine maintenance 2.4. Identify adjustments that need to be carried out on a lift truck routine maintenance service schedule
3. Understand the procedures required to carry out routine lift truck maintenance	3.1. Describe the procedures used for checking the condition and serviceability of routine service components 3.2. Describe the procedures for checking, replenishing and replacing routine service components and materials 3.3. Describe how to identify the codes and grades of lubricants 3.4. Describe the procedure for reporting damage to the lift truck and or components outside normal service items 3.5. Identify the operating specifications for the systems being checked while carrying out lift truck routine maintenance

Content to Include:

The different types of Lift truck including:

- a. Warehouse equipment
- b. Counterbalance trucks
- c. Others

Systems to be inspected while carrying out lift truck routine maintenance

- a. Power plant system
- b. Mechanical handling system
- c. Wheels and tyres
- d. Transmission system
- e. Electrical and electronic systems
- f. Steering systems
- g. Braking system
- h. Hydraulic system

Warehouse equipment

- a. Pedestrian Pallet Truck
- b. Powered Pedestrian Pallet Truck
- c. Pedestrian Stacker Truck
- d. Reach Truck
- e. Low Level Order Picker
- f. High Level Order Picker – Man Up and Man Down
- g. Other Very Narrow Aisle (VNA) Equipment

Counterbalance Equipment

- a. Standard
- b. Articulated
- c. Rough Terrain – mast, boom, telescopic

Other Equipment

- a. Sideloader
- b. Four Way Sideloader
- c. Lorry Mounted
- d. Container Handlers etc

Operation of chassis systems and components

- a. Tyre construction:
 - i. different types of tyre:
 - ii. super-elastic
 - iii. pneumatic
 - iv. solid
 - v. cushion
 - vi. P.O.Bs and anti marking
- b. Tyre markings:
 - i. tyre & wheel size markings
 - ii. tyre wear marking
- c. Lift Truck wheels:
 - i. press ons
 - ii. SIT
 - iii. split rim
- d. Wheel bearing arrangements:
 - i. non-driving and driven wheel arrangements
 - ii. fully floating
 - iii. three quarter floating and semi floating

Content to Include:

- e. Types of bearing to include:
 - i. roller
 - ii. taper roller
 - iv. needle
 - v. ball and plain

- f. Construction and operation of drum brakes:
 - i. brake drums
 - ii. linings and shoes
 - iii. leading and trailing shoes
 - iv. self-servo action
 - v. automatic adjusters
 - vi. backing plates
 - vii. parking brake system
- g. Construction and operation of disc brakes:
 - i. disc pads
 - ii. calliper
 - iii. brake disc
 - iv. wet disc
 - v. disc pad retraction
 - vi. parking brake system
 - vii. electrical and electronic components
 - viii. wear indicators and warning lamps
- h. Construction and operation of the hydraulic braking system:
 - i. single line systems:
 - ii. master cylinders
 - iii. wheel cylinders
 - iv. disc brake caliper & pistons
 - v. pipes
 - vi. brake servo
 - vii. warning lights
 - viii. parking brakes and equalising valves
- i. Requirements of brake fluid:
 - i. properties
 - ii. hygroscopic action
 - iii. manufacturer's change periods
 - iv. fluid classification and rating
- j. Terms associated with mechanical and hydraulic braking systems:
 - i. braking efficiency
 - ii. legal requirements – CE standard
 - iii. brake fade
 - iv. brake balance
- k. Layout and operation of Lift Truck axle systems: layout and components of axle mounting including:
 - i. solid axle mounting
 - ii. swinging axle with mounting blocks

Content to Include:

- I. Principles of steering
 - i. castor
 - ii. camber
 - iii. kingpin or swivel pin inclination
 - iv. wheel alignment (tracking)
 - v. toe in and toe out
 - vi. Ackerman principle
 - vii. toe-out on turns
 - viii. oversteer and understeer
 - ix. neutral steer
 - x. self-aligning torque
 - xi. slip angles
- m. Construction and operation of full power and power assisted steering:
 - i. power cylinders
 - ii. drive, systems and pumps
 - iii. hydraulic valve (rotary, spool and flapper type)
 - iv. introduction to principles of electrical and electronic systems
 - v. electrical and electronic components
- n. Principles of hydraulics
 - i. Pascals law
 - ii. pressure, force and area
 - iii. hydraulic symbols to BS2917
 - iv. fluid types
- o. Construction and operation of hydraulic systems
 - i. traction motors
 - ii. hydraulic motors
 - iii. steer motors
 - iv. actuators
 - v. cylinders
 - vi. valves
 - vii. pipes
 - viii. filters
- p. Principles of mechanical handling
 - i. stability
 - ii. angle of tilt
 - iii. centre of gravity
 - iv. load centre
 - v. lost load centre
- q. Construction and operation of mechanical handling systems
 - i. masts: triple, free Lift, duplex,
 - ii. mast visibility issues
 - iii. carriages: side shift and attachments
 - iv. lift chains
 - v. forks

Operation of transmission systems and components

- a. Calculate gear ratios and driving torque for typical gearbox specifications.
- b. Principle and components of Lift Truck power shift transmission systems:
 - i. fluid coupling
 - ii. torque converter
 - iii. clutch packs
 - iv. power shift transmissions
 - v. epicyclic gears
 - vi. brake bands
 - vii. hydrostatic systems
 - viii. principle of electronic units

Content to Include:

- c. Construction and operation of driveline components:
 - i. propshafts
 - ii. drive shafts
 - iii. front wheel
 - iv. rear wheel layouts
 - v. four-wheel drive systems
 - vi. direct drive electric motors
- d. Reasons for using flexible couplings and sliding joints in transmissions systems.
- e. Reasons for using constant velocity joints in drive shafts that incorporate steering mechanisms.
- f. Construction of final drive unit:
 - i. crown wheel & pinion
 - ii. bevel
 - iii. hypoid and helical gears
 - iv. differential gears
 - v. sun & planet gears
 - vi. lubricants
 - vii. lubrication bearings and seals

Operation of electrical and electronic systems and components

- a. Electrical and electronic principles
 - i. current flow
 - ii. electron flow
 - iii. voltage
 - iv. amperage
 - v. resistance
 - vi. circuit diagrams
 - vii. common electrical and electronic symbols
- b. Construction and operation of:
 - i. the lead acid battery – traction and auxiliary
 - ii. plates
 - iii. separators
 - iv. electrolyte
 - v. charging and discharging including off vehicle charging
- c. Components operation construction and wiring of engine starting systems:
 - i. inertia and pre-engaged types
 - ii. ring gear
 - iii. starter solenoid
 - iv. pinion
 - v. ignition switch
 - vi. one way clutch (pre-engaged starter motor)
- d. Operation of electrical auxiliary systems:
 - i. front and tail lamps
 - ii. work lamps
 - iii. lighting switch
 - iv. interior lights
 - v. anti-theft devices
 - vi. immobilisers
 - vii. fan and heater
 - xi. directional indicator system and circuit
 - xii. use of relays
 - xiii. types of bulb
 - xiv. circuit protection devices
- e. Basic statutory requirements when using a Lift Truck on a site or road.

Content to Include:

- f. Basic operating principles for traction control (SCR and MOSFET systems)
 - i. thyristers
 - ii. diodes
 - iii. Zenor diodes
 - iv. inductors
 - v. shunts
 - vi. potentiometers
 - vii. commutation
 - viii. MOSFET (depletion and enhancement)
 - ix. canbus

Operation of engine systems and components

- a. Lift Truck engine types and configurations:
 - i. inline
 - ii. vee
 - iii. four-stroke cycle for spark ignition and compression ignition engines
 - iv. naturally aspirated and turbo-charged engines
 - v. hybrid fuel engines
- b. Engine operation:
 - i. four stroke cycle for spark ignition and compression ignition engines
- c. Engine components:
 - i. crankshafts
 - ii. single (OHC) and multi-camshaft (DOHC)
 - iii. single and multi cylinder (2, 4, 6, 8 cylinder)
 - iv. cylinder head layout and construction
 - v. combustion chamber
 - vi. pistons
 - vii. inlet and exhaust manifold system
 - viii. exhaust system
 - ix. silencers, catalytic converters and particulate filters
- d. Calculate the compression ratio of an engine from given data.
- e. Exhaust emissions:
 - i. composition of hydro-carbon fuels
 - ii. % hydrogen and carbon in petrol/LPG and diesel fuels
 - iii. composition of air (% nitrogen, oxygen)
 - iv. chemically correct air/fuel ratio for petrol/LPG engines as 14.7:1($\lambda = 1$, stoichiometric ratio)
 - v. weak and rich air/fuel ratios for petrol/LPG engines
 - vi. exhaust composition and by-products for chemically correct
 - vii. rich and weak air/fuel ratios of petrol /LPG engines
- f. Engine lubrication:
 - i. wet and dry systems
 - ii. splash and pressurised systems
 - iii. pumps
 - iv. relief valves
 - v. filters and oil coolers
- g. Terms associated with lubrication and engine oil:
 - i. full-flow
 - ii. hydrodynamic
 - iii. boundary lubrication
 - iv. viscosity
 - v. multi-grade
 - vi. natural and synthetic oil
 - vii. viscosity index
 - viii. multi-grade and extreme pressure

Content to Include:

- h. Composition and principles of engine oil:
 - i. operating temperatures
 - ii. pressures
 - iii. lubricant grades
 - iv. viscosity
 - v. additives to include detergents
 - vi. dispersants
 - vii. anti-oxidant inhibitors
 - viii. anti-foaming
 - ix. anti-wear
 - x. synthetic oils
 - xi. organic oils and mineral oils
- i. Construction and overview of internal heater systems.
- j. Diesel fuel injection systems:
 - i. overview and layout of inline and rotary diesel systems
 - ii. components and operation
 - iii. fuel filters
 - iv. sedimenters
 - v. agglomerators (water trap)
 - vi. injectors types (direct and indirect injection)
 - vii. injectors types (single, multi and pintle nozzle types)
 - viii. governors
 - ix. fuel pipes
 - x. glow plugs
 - xi. vacuum pumps
 - xii. cold start devices
 - xiii. fuel cut-off solenoid
 - xiv. flame plugs
- k. Principles of turbochargers: reasons for
 - i. construction and operation
 - ii. use of inter-coolers
- l. Construction and operation of L.P.G. fuel systems:
 - i. Beam, Impco and Centuri
 - ii. regulators
 - iii. vaporisers
 - iv. carburettors/ gas injection
 - v. filters
 - vi. safety devices
 - vii. electronic control
 - viii. gas cylinders
 - ix. gas storage
- m. Principles of electronic ignition systems:
 - i. circuits and components
 - ii. LT Circuit; battery
 - iii. ignition switch
 - iv. electronic trigger devices
 - v. capacitors
 - vi. HT Circuit
 - vii. spark plugs (reach, heat range, electrode features and electrode polarity),
 - viii. rotor arm
 - ix. distributor (if applicable)
 - x. distributor cap
 - xi. ignition leads
 - xii. ignition coil/ coil packs
 - xiii. ignition timing advance

Content to Include:

- n. Electronic ignition system components:
 - i. amplifiers
 - ii. triggering systems
 - iii. inductive pick-ups
 - iv. hall generators
 - v. optical pulse generators
 - vi. control units
- o. Basic concepts of engine management:
 - i. closed and open loop systems
 - ii. integrated ignition and injection systems
 - iii. sensors

Legal requirements relating to Lift Truck repair and testing

- a. Identify the legal requirements required before using Lift Trucks on site/road;
 - i. site/road safety requirements
 - ii. lighting
 - iii. tyres
 - iv. chains
 - v. steering
 - vi. braking
 - vii. Lift chains/forks
 - viii. seat belts
 - ix. site/road worthiness
- b. Identify the requirements for the driver and the Lift Truck;
 - i. appropriate drivers licence
 - ii. road fund licence,
 - iii. Lift Truck insurance
 - iv. LOLER/PUWER regulations
- c. Requirements when driving Lift Trucks (company owned, customers) on site/road:
 - i. seat belts
 - ii. speed limits
 - iii. care of Lift Truck
 - iv. adherence to site/Highway Code
 - v. Identify the main requirement of the Road Traffic Act and LOLER/PUWER regulations.

Health and safety requirements relating to lift truck repair and testing

- a. The relevant health and safety legislation relating to the repair of Lift Truck including:
 - i. Health & Safety at Work Act
 - ii. COSHH
 - iii. EPA
- b. The requirements for lift truck protection and personal protection (PPE) when working on lift trucks.
- c. The hazards and risks involved in repair removal and replacement of units and systems: safety precautions and procedures involved with mechanical, electrical and electronic repair or dismantling.
- d. Requirements for disposal of old units, materials, components and fluids.
- e. Fire hazards and safety:
 - i. fire extinguishers
 - ii. actions in the event of a fire
 - iii. fire drill
 - iv. fire exits
- f. Procedures for dealing with accidents at work.
- g. The need for appropriate personal conduct in lift truck workshop situations:
 - i. awareness and care of others
 - ii. avoidance of inappropriate behaviour

Content to Include:
Technical information relating to lift truck repair and testing

- a. Relevant sources information for servicing repair and testing of lift trucks;
 - i. Lift Truck specifications
 - ii. identification codes
 - iii. service schedules
 - iv. LOLER/PUWER testing requirements
 - v. equipment information
 - vi. procedures for use of equipment repair procedures
 - vii. test plans
- b. Types of information:
 - i. paper based
 - ii. hard copy manuals
 - iii. computer stored data
 - iv. on-board diagnostic displays
 - v. CD ROM
 - vi. Internet
 - vii. manufacturer's web site

The organisational requirements relating to lift truck repair and testing

- a. The documentation involved in Lift Truck repair and maintenance processes:
 - i. company job cards
 - ii. manufacturer's service schedules
 - iii. test plans
 - iv. inspection sheets
 - v. LOLER/PUWER requirements
 - vi. customer site requirements
 - vii. Lift Truck service record
- b. The relationship between time, costs and profit.
- c. The need to report promptly any delays and/or additional work required to relevant supervisory person.

Information from a variety of sources

- a. The use and importance of information sources:
 - i. hard copy technical manuals
 - ii. technical bulletins
 - iii. manufacturer's servicing schedules
 - iv. job card instructions
 - v. inspection records
 - vi. check lists
 - vii. LOLER/PUWER inspection requirements and repair procedures
 - viii. Trade Associations
- b. How to access information types:
 - i. paper based
 - ii. hard copy manuals
 - iii. computer stored data
 - iv. on-board diagnostic displays
 - v. CD Rom
 - vi. Internet
 - vii. web-based information

Content to Include:
Lift Truck maintenance, inspection and adjustment and record findings

- a. Lift truck inspection techniques used in routine maintenance including:
 - i. aural
 - ii. visual and functional assessments on engine
 - iii. engine systems
 - iv. chassis systems
 - v. wheels and tyres
 - vi. transmission system
 - vii. electrical and electronic systems
 - viii. exterior Lift Truck body
 - ix. Lift Truck mechanical handling systems
- b. The procedures used for inspecting the condition and serviceability of the following:
 - i. filters
 - ii. drive belts
 - iii. brake linings
 - iv. pads
 - v. Lift chains
 - vi. fork checks
- c. How to prepare and use appropriate equipment:
 - i. test instruments
 - ii. emission equipment
 - iii. chain and fork gauges
 - iv. hydraulic tests
 - v. load centre checks
- d. The procedures for checking and replenishing fluid levels:
 - i. oil
 - ii. water
 - iii. hydraulic fluids
- e. The procedures for checking and replacement of lubricants:
 - i. replace oil filters
 - ii. check levels
 - iii. types of oil
 - iv. cleanliness
 - v. disposal of old oil and filters
- f. The procedures for carrying out adjustments on lift truck systems or components:
 - i. clearances
 - ii. settings
 - iii. alignment
 - iv. operational performance (engine idle, exhaust gas)
- g. Electrical: operation, security, performance
- h. The importance and process of detailed inspection procedures:
 - i. following inspection checklists
 - ii. checking conformity to manufacturer's specifications
 - iii. UK and European legal requirements
- i. The important and process of completing all relevant documentation relating to routine maintenance:
 - i. inspection records
 - ii. job cards
 - iii. lift truck repair records
 - iv. lift truck service history

The need to check the lift truck following routine maintenance

- a. The need to inspect the lift truck following routine maintenance:
 - i. professional presentation of lift truck
 - ii. customer perceptions
- b. The basic checks of lift truck following routine maintenance:
 - i. removal of oil and grease marks
 - ii. body panels
 - iii. paint surfaces
 - iv. seats
 - v. re-instatement of components



UNIT REF: LT02.1K	UNIT TITLE: KNOWLEDGE OF LIFT TRUCK POWER PLANT, LUBRICATION AND COOLING SYSTEM UNITS AND COMPONENTS
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Level: 2	Route: Knowledge	Credit Value: 3	GLH: 20
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Mapping: This unit is mapped to the IMI NOS LT02

Rationale:
 This unit enables the learner to develop an understanding of the construction and operation of common power plants, lubrication and cooling systems. It also covers the procedures involved in the removal and replacement of system components and the evaluation of their performance.

LEARNING OUTCOMES	ASSESSMENT CRITERIA
<p>The Learner will:</p> <p>1. Understand how the main lift truck power plant systems operate</p>	<p>The Learner can:</p> <p>1.1. Identify lift truck power plant system components including diesel engine, gas engine and electric</p> <p>1.2. Describe the construction and operation of lift truck power plant systems</p> <p>1.3. Compare key lift truck engine power plant system components and assemblies against alternatives to identify differences in construction and operation</p> <p>1.4. Identify the key engineering principles that are related to lift truck power plant systems</p> <ul style="list-style-type: none"> a. compression ratio's b. volumetric efficiency c. cylinder capacity d. electric motor principles <p>1.5. State common terms used in lift truck power plant system design</p>
<p>2. Understand how lift truck engine lubrication systems operate</p>	<p>2.1. Identify lift truck engine lubrication system components</p> <p>2.2. Describe the construction and operation of lift truck engine lubrication components and systems</p> <p>2.3. Compare key lift truck lubrication system components and assemblies to identify differences in construction and operation</p> <p>2.4. Identify the key engineering principles that are related to lift truck engine lubrication systems</p> <ul style="list-style-type: none"> a. classification of lubricants b. properties of lubricants c. methods of reducing friction <p>2.5. State common terms used in lift truck engine lubrication system design</p>



3. Understand how lift truck cooling systems operate	<ul style="list-style-type: none">3.1. Identify lift truck engine cooling system components3.2. Describe the construction and operation of lift truck engine cooling systems3.3. Compare key lift truck engine cooling system components and assemblies against alternatives to identify differences in construction and operation3.4. Identify the key engineering principles that are related to lift truck engine cooling systems<ul style="list-style-type: none">a. heat transferb. linear and cubical expansionc. specific heat capacityd. boiling point of liquids3.5. State common terms used in key lift truck engine cooling system design
4. Understand how to check, replace and test power plant, lubrication and cooling system units and components	<ul style="list-style-type: none">4.1. Describe how to remove and replace power plant, lubrication and cooling system units and components4.2. Describe common types of testing methods used to check the operation of power plant, lubrication and cooling system units and components and their purpose4.3. Describe how to evaluate the performance of replacement units against lift truck specification4.4. Describe common faults found in lift truck power plant, lubrication and cooling systems and their causes

Content to Include:
The construction and operation of lift truck power plant systems including:

- a. Four stroke
- b. Spark ignition
- c. Compression ignition
- d. Electric motor

Common terms used in lift truck power plant system design including:

- a. tdc
- b. bdc
- c. Stroke
- d. Bore
- e. AC & DC
- f. Electrical terms

The construction and operation of lift truck engine lubrication components and systems including:

- a. Full flow
- b. By pass
- c. Wet sump
- d. Dry sump

Construction of petrol/LPG and diesel engines

- a. Engine types and configurations:
 - i. inline
 - ii. vee
 - iii. four-stroke cycle or spark ignition and compression ignition engines
 - iv. naturally aspirated and turbo-charged engines
 - v. hybrid fuel engines
- b. Compare the relative advantages and disadvantages of different engine types and configurations.
- c. Engine components and layouts:
 - i. crankshaft
 - ii. single (OHC) and multi camshaft (DOHC)
 - iii. single and multi cylinder (2, 4, 6, 8 cylinder types)
- d. Cylinder head layout and design, combustion chamber and piston design.
- e. Calculate compression ratios from given data.

Operation of engine systems and components

- a. Engine types and configurations:
 - i. inline
 - ii. vee
 - iii. naturally aspirated and turbo-charged engines
 - v. hybrid fuel engines
- b. Engine operation:
 - i. four-stroke cycle
 - ii. compression ignition cycles
- c. Engine components and layouts:
 - i. crankshafts
 - ii. single (OHC) and multi camshaft (DOHC)
 - iii. single and multi cylinder (2, 4, 6, 8 cylinder)
 - iv. cylinder head
 - v. combustion chamber
 - vi. pistons
 - vii. inlet and exhaust systems
 - viii. silencers, catalytic converters and particulate filters

Content to Include:
Engine lubricating systems

- a. The advantages and disadvantages of wet and dry systems.
- b. Engine lubrication system:
 - i. splash and pressurised systems
 - ii. pumps
 - iii. pressure relief valve
 - iv. filters
 - v. oil ways
 - vi. oil coolers
- c. The following terms associated with lubrication and engine oil:
 - i. full-flow
 - ii. hydrodynamic
 - iii. boundary
 - iv. viscosity
 - v. multi-grade
 - vi. natural and synthetic oil
 - vii. viscosity index
 - viii. multi-grade
- d. The requirements and features of engine oil:
 - i. operating temperatures
 - ii. pressures
 - iii. lubricant grades
 - iv. viscosity
 - v. multi-grade oil
 - vi. additives
 - vii. detergents
 - viii. dispersants
 - ix. anti-oxidants inhibitors
 - x. anti-foaming agents
 - xi. anti-wear
 - xii. synthetic oils
 - xiii. organic oils
 - xiv. mineral oils

Engine cooling systems

- a. Heat transfer - conduction, convection, radiation
- b. The layout and construction of the cooling systems
- c. The components of the cooling system:
 - i. radiator
 - ii. pumps and pump types
 - iii. hoses
 - iv. fans and drive types
 - v. thermostats
 - vi. switches and sensors
 - vii. expansion tanks/filler caps
 - viii. coolant type and additives
 - ix. engine circulation
 - x. removal and replacement procedures for the above

Operation of Lift Truck heating systems

- a. The layout and construction of internal heater systems.
- b. Explain the controls and connections within internal heater system.

Content to Include:
Testing and inspection techniques used for Lift Truck engine systems

- a. The procedures used when inspecting engines and engine systems including:
 - i. mechanical components
 - ii. induction and air filtration
 - iii. lubrication system
 - iv. internal heating system
 - v. ignition system
 - vi. LPG and diesel system
 - vii. engine management
 - viii. sensors
- b. The procedures to assess:
 - i. serviceability
 - ii. wear
 - iii. condition
 - iv. clearances
 - v. settings
 - vi. linkages
 - vii. joints
 - viii. fluid systems
 - ix. leaks
 - x. adjustments
 - xi. electrical and electronic units
 - xii. electrical system
 - xiii. operation and functionality
 - xv. security
 - xvi. connections
 - xvii. continuity
 - xviii. earth connections

Common faults associated with Lift Truck engine operation and engine systems

- a. Symptoms and faults associated with engine operation:
 - i. poor performance
 - ii. abnormal or excessive mechanical noise
 - iii. erratic running
 - iv. low power
 - v. exhaust emissions
 - vi. abnormal exhaust smoke
 - vii. unable to start
 - viii. misfiring
 - ix. running-on
 - x. surging
 - xi. ignition noise (pinking)
 - xii. excessive fuel consumption
 - xiii. excessive oil consumption
 - xiv. oil leaks
 - xv. exhaust gas leaks to cooling system
 - xvi. water leaks
 - xvii. water in oil
 - xviii. oil in water
 - xix. exhaust gas leaks
 - xx. excessively low or high coolant temperature

**Content to Include:****Procedures for dismantling, removal and replacement of engine units and engine system components**

- a. The preparation, testing and use of tools and equipment used for:
 - i. dismantling
 - ii. removal and replacement of engine units and components
- b. Appropriate safety precautions:
 - i. PPE
 - ii. Lift Truck protection when dismantling
 - iii. removal and replacing engine units and components
- c. The importance of logical and systematic processes.
- d. The inspection and testing of engine units and components.
- e. The preparation of replacement units for re-fitting or replacement.
- f. The reasons why replacement components and units must meet the original specifications (OES) – warranty requirements, to maintain performance and safety requirements.
- g. Refitting procedures.
- h. The inspection and testing of units and system to ensure compliance with manufacturer's, legal and performance requirements.
- i. The inspection and re-instatement of the Lift Truck following repair to ensure customer satisfaction;
 - i. cleanliness of Lift Truck interior and exterior
 - ii. security of components and fittings
 - iii. re-instatement of components and fittings



UNIT REF: LV02.2K	UNIT TITLE: KNOWLEDGE OF LIFT TRUCK FUEL, IGNITION, AIR AND EXHAUST SYSTEM UNITS AND COMPONENTS
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Level: 2	Route: Knowledge	Credit Value: 3	GLH: 20
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Mapping: This unit is mapped to the IMI NOS LV02

Rationale:
 This unit enables the learner to develop an understanding of the construction and operation of common fuel, ignition, air and exhaust systems. It also covers the procedures involved in the removal and replacement of system components and the evaluation of their performance

LEARNING OUTCOMES	ASSESSMENT CRITERIA
The Learner will:	The Learner can:
1. Understand how lift truck fuel systems operate	1.1. Identify lift truck fuel system components 1.2. Describe the construction and operation of lift truck fuel systems 1.3. Compare key lift truck fuel system components and assemblies against alternatives to identify differences in construction and operation 1.4. Identify the key engineering principles that are related to lift truck fuel systems <ul style="list-style-type: none"> a. properties of fuels b. combustion processes c. exhaust gas constituents 1.5. State common terms used in lift truck fuel system design
2. Understand how lift truck ignition systems operate	2.1. Identify lift truck ignition system components 2.2. Describe the construction and operation of lift truck ignition systems including distributor ignition systems and distributor less ignition systems 2.3. Compare key lift truck ignition system components and assemblies against alternatives to identify differences in construction and operation 2.4. Identify the key engineering principles that are related to lift truck ignition systems <ul style="list-style-type: none"> a. flame travel b. ignition timing 2.5. State common terms used in key lift truck ignition system design

<p>3. Understand how lift truck air supply and exhaust systems operate</p>	<p>3.1. Identify lift truck air supply and exhaust system components</p> <p>3.2. Describe the construction and operation of lift truck air supply and exhaust systems</p> <p>3.3. Compare key lift truck air supply and exhaust system components and assemblies against alternatives to identify differences in construction and operation</p> <p>3.4. Identify the key engineering principles that are related to lift truck air supply and exhaust systems</p> <ol style="list-style-type: none"> a. sound absorption b. reduction of harmful emissions <p>3.5. State common terms used in lift truck air supply and exhaust system design</p>
<p>4. Understand how to check, replace and test lift truck fuel, ignition, air and exhaust system units and components</p>	<p>4.1. Describe how to remove and replace lift truck fuel, ignition, air supply and exhaust system units and components</p> <p>4.2. Describe common types of testing methods used to check the operation of engine fuel, air supply and exhaust systems and their purpose</p> <p>4.3. Describe how to evaluate the performance of replacement units against lift truck specification</p> <p>4.4. Describe common faults found in lift truck fuel, air supply and exhaust systems and their causes</p>

Content to Include:

Operation of Lift Truck diesel fuel systems

- a. The layout and construction of inline and rotary diesel systems.
- b. The principles and requirements of compression ignition engines:
 - i. combustion chambers (direct and indirect injection)
- c. The function and basic operation of diesel fuel injection components:
 - i. fuel filters
 - ii. sedimenters
 - iii. injectors
 - iv. injector types (direct and indirect injection)
 - v. single
 - vi. multi-hole and pintle nozzle types
 - vii. governors
 - viii. fuel pipes
 - ix. glow plugs
 - x. cold start devices
 - xi. fuel cut-off solenoid
- d. The purpose and operation of:
 - i. turbochargers
 - ii. construction
 - iii. use of inter-coolers
- e. The procedures for injection pump timing and bleeding the system.

Content to Include:
Operation of LPG fuel injection systems

- a. The function and layout of LPG injection systems:
 - i. mechanical and electronic systems
 - ii. fuel pumps
 - iii. injectors
 - iv. control valves
 - v. sensors
 - vi. pressure regulators

The principles of combustion and exhaust emissions

- a. The meaning of terms related to:
 - i. hydro-carbon fuels
 - ii. volatility
 - iii. calorific value
 - iv. flash point
 - v. octane value
 - iv. cetane value
- b. The composition of hydro-carbon fuels:
 - i. % hydrogen and carbon in petrol / LPG and diesel fuels
 - ii. Identify the composition of air (% nitrogen, oxygen), % of oxygen.
- c. The chemically correct air/fuel ratio for petrol / LPG engines as 14.7:1 (lambda 1, stoichiometric ratio).
- d. Weak and rich air/fuel ratios for petrol/LPG engines.
- e. Exhaust composition and by-products for chemically correct, rich and weak air/fuel ratios of petrol/LPG engines:
 - i. water vapour (H₂O)
 - ii. nitrogen (N)
 - iii. carbon monoxide (CO)
 - iv. carbon dioxide (CO₂)
 - v. carbon (C)
 - vi. hydrocarbon (HC)
 - vii. oxides of nitrogen (NO_x, NO₂, NO) and particulates
- f. The relative advantages and disadvantages of diesel and petrol /LPG engines.
- g. The advantages and disadvantages of different engine configurations.
- h. The construction and purpose of air filtration systems.
- i. The operating principles of air filtration systems.
- j. Exhaust system design to include silencers and catalytic converters.

Operation and components of ignition systems

- a. The layout of electronic ignition systems, advantages over conventional systems (points).
- b. Electronic ignition circuits and components:
 - i. LT Circuit
 - ii. battery
 - iii. ignition switch
 - iv. electronic trigger devices
 - v. capacitor
 - vi. HT Circuit
 - vii. spark plugs (reach, heat range, electrode features and electrode polarity)
 - viii. rotor arm
 - ix. distributor (if applicable)
 - x. distributor cap
 - xi. ignition leads
 - xii. ignition coil
 - xiii. ignition timing advance system

Content to Include:

- c. The operation electronic system components:
 - i. amplifiers
 - ii. triggering systems
 - iii. inductive pick-ups
 - iv. hall generators
 - v. optical pulse generators
 - vi. control units
- d. Operation of amplifier units.
- e. Ignition terminology:
 - i. dwell angle
 - ii. dwell time
 - iii. dwell variations
 - iv. advance and retard of ignition timing
 - v. static and dynamic ignition timing
- f. The operation of electronic ignition systems under various conditions and loads to include:
 - i. engine idling
 - ii. during acceleration
 - iii. under full load
 - iv. cruising
 - v. overrun
 - vi. cold starting
- g. The operation breaker type ignition systems and components

Principles of engine management systems

- a. Basic the principle of engine management systems:
 - i. closed loop system
 - ii. integrated ignition
 - iii. injection systems
 - iv. sensors

Testing and inspection techniques used for Lift Truck engine systems

- a. The procedures used when inspecting engines and engine systems including:
 - i. mechanical components
 - ii. induction and air filtration
 - iii. lubrication system
 - iv. internal heating system
 - v. ignition system
 - vi. LPG and diesel system
 - vii. engine management
 - viii. sensors
- b. The procedures to assess:
 - i. serviceability
 - ii. wear
 - iii. condition
 - iv. clearances
 - v. settings
 - vi. linkages
 - vii. joints
 - viii. fluid systems
 - ix. leaks
 - x. adjustments
 - xi. electrical and electronic units
 - xii. electrical system
 - xiii. operation and functionality
 - xiv. security
 - xv. connections
 - xvi. continuity
 - xvii. earth connections

Content to Include:
Common faults associated with Lift Truck engine operation and engine systems

- a. Symptom and faults associated with engine systems:
 - i. Internal Heating System: efficiency, operation, leaks, controls, air filtration, air leaks, contamination
 - ii. Lubrication System: low or excessive pressure, oil leaks, oil contamination
 - iii. Diesel Fuel System: air in fuel system, water in fuel, filter blockage, leaks, difficult starting, erratic running, excessive smoke (black, blue, white), engine knock, turbocharger faults
 - iv. LPG System: leaks, erratic running, excessive smoke, poor starting, poor performance, poor fuel economy, failure to start, exhaust emissions
 - v. Ignition System: failure to start hot or cold, erratic running, poor performance, misfire, exhaust emissions

Procedures for dismantling, removal and replacement of engine units and engine system components

- a. The preparation, testing and use of tools and equipment used for:
 - i. dismantling
 - ii. removal and replacement of engine units and components
- b. Appropriate safety precautions:
 - i. PPE
 - ii. Lift Truck protection when dismantling
 - iii. removal and replacing engine units and components
- c. The importance of logical and systematic processes.
- d. The inspection and testing of engine units and components.
- e. The preparation of replacement units for re-fitting or replacement.
- f. The reasons why replacement components and units must meet the original specifications (OES) – warranty requirements, to maintain performance and safety requirements.
- g. Refitting procedures.
- h. The inspection and testing of units and system to ensure compliance with manufacturer's, legal and performance requirements.
- i. The inspection and re-instatement of the Lift Truck following repair to ensure customer satisfaction;
 - i. cleanliness of Lift Truck interior and exterior
 - ii. security of components and fittings
 - iii. re-instatement of components and fittings



Learner Name:

UNIT REF: LT02C	UNIT TITLE: COMPETENCY IN REMOVING AND REPLACING LIFT TRUCK POWER PLANTS UNITS AND COMPONENTS
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Level: 2	Route: Competence	Credit Value: 10	GLH: 90
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Mapping: This unit is mapped to LT02

Rationale: This unit allows the learner to develop skills to remove and replace lift truck power plant units and components. It also covers the evaluation of performance of the replaced units and systems

LEARNING OUTCOMES	ASSESSMENT CRITERIA	Ref No	Date
The Learner will:	The Learner can:		
1. Be able to work safely when carrying out removal and replacement activities	1.1. Wear suitable personal protective equipment and use suitable coverings throughout all power plant unit and component removal and replacement activities 1.2. Work in a way which minimises the risk of damage or injury to the lift truck, people and the environment		
2. Be able to use relevant information to carry out the task	2.1. Select suitable sources of technical information to support lift truck power plant unit and component removal and replacement activities including: a. technical data b. removal and replacement procedures c. legal requirements 2.2. Interpret technical information to support lift truck power plant unit and component removal and replacement activities		
3. Be able to use appropriate tools and equipment	3.1. Select the appropriate tools and equipment necessary for removal and replacement of lift truck power plant units and components 3.2. Ensure that equipment has been calibrated to meet manufacturers' and legal requirements 3.3. Use the correct tools and equipment in the way specified by manufacturers to remove and replace lift truck power plant units and components		
4. Be able to carry out removal and replacement of lift truck power plant units and components.	4.1. Remove and replace the lift truck power plant units and components, adhering to the correct specifications and tolerances and following: a. manufacturer's approved removal and replacement methods b. recognised researched repair methods c. health and safety requirements. 4.2. Ensure that the repaired or replaced lift truck power plant units and components conform to the operating specification and any legal requirements 4.3. Use suitable testing methods to evaluate the performance of the reassembled system 4.4. Work to the specified timescale for the activity		



<p>5. Be able to record information and make suitable recommendations</p>	<p>5.1. Produce work records that are accurate, complete and passed to the relevant person(s) promptly in the format required</p> <p>5.2. Make suitable and justifiable recommendations for cost effective repairs</p> <p>5.3. Identify and report any expected delays in completion to the relevant person(s) promptly in the format required.</p> <p>5.4. Record and report any additional faults noticed during the course of their work promptly in the format required</p>		
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EVIDENCE REQUIREMENTS

<p>1. You must produce evidence of removing and replacing at least 1 unit or component from at least 3 of the 6* systems listed below. The evidence must come from work in your normal workplace.</p>	<p>Evidence Ref:</p>
<p>engine mechanical system</p>	
<p>cooling system</p>	
<p>air supply and exhaust systems</p>	
<p>fuel and ignition systems</p>	
<p>engine electrical systems</p>	
<p>lubrication system</p>	
<p>2. You must be observed by your assessor on at least 1 occasion removing and replacing components or units.</p>	<p>Observation Ref:</p>

*However, you must prove to your assessor that you have the necessary knowledge and understanding to be able to perform competently in respect of **all** the systems listed above.

Evidence from simulated activities is **not** acceptable for this unit.

<p>ASSESSOR SIGNATURE:</p>	<p>PIN NO:</p>	<p>DATE:</p>
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Learner Name:

UNIT REF: LT03C	UNIT TITLE: COMPETENCY IN REMOVING AND REPLACING LIFT TRUCK ELECTRICAL UNITS AND COMPONENTS
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Level: 2	Route: Competence	Credit Value: 10	GLH: 90
Mapping: This unit is mapped to IMI NOS LT03			
Rationale: This unit allows the learner to develop skills to remove and replace lift truck electrical system components. It also covers the evaluation of performance of the replaced units and systems			

LEARNING OUTCOMES	ASSESSMENT CRITERIA	Ref No	Date
The Learner will:	The Learner can:		
1. Be able to work safely when carrying out removal and replacement activities	1.1. Wear suitable personal protective equipment and use suitable coverings throughout all lift truck electrical unit and component removal and replacement activities 1.2. Work in a way which minimises the risk of damage or injury to the lift truck, people and the environment		
2. Be able to use relevant information to carry out the task	2.1. Select suitable sources of technical information to support lift truck electrical unit and component removal and replacement activities including: <ul style="list-style-type: none"> a. technical data b. removal and replacement procedures c. legal requirements 2.2. Interpret technical information to support lift truck electrical unit and component removal and replacement activities		
3. Be able to use appropriate tools and equipment	3.1. Select the appropriate tools and equipment necessary for removal and replacement of lift truck electrical units and components 3.2. Check that equipment has been calibrated to meet manufacturers' and legal requirements 3.3. Use the correct tools and equipment in the way specified by manufacturers to remove and replace lift truck electrical units and components		
4. Be able to carry out removal and replacement of lift truck electrical units and components.	4.1. Remove and replace lift truck electrical units and components, adhering to the correct specifications and tolerances and following: <ul style="list-style-type: none"> a. the manufacturer's approved removal and replacement methods b. recognised researched repair methods c. health and safety requirements. 4.2. Ensure that replaced and reassembled lift truck electrical units and components conform to the operating specification and any legal requirements 4.3. Use suitable testing methods to evaluate the performance of the reassembled system 4.4. Work to the specified timescale for the activity		



<p>5. Be able to record information and make suitable recommendations</p>	<p>5.1. Produce work records that are accurate, complete and passed to the relevant person(s) promptly in the format required</p> <p>5.2. Make suitable and justifiable recommendations for cost effective repairs</p> <p>5.3. Identify and report any expected delays in completion to the relevant person(s) promptly in the format required.</p> <p>5.4. Record and report any additional faults noticed during the course of their work promptly in the format required</p>		
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EVIDENCE REQUIREMENTS

<p>1. You must produce evidence of removing and replacing at least 4* units or components, each from a different electrical system. At least 3 out of the 4 pieces of evidence must come from work in your normal workplace.</p>	<p>Evidence Ref:</p>			
<p>2. You must be observed by your assessor on at least 1 occasion in your normal workplace carrying out the removal and replacement of 2 of the electrical units or components from the systems listed below.</p>	<p>Observation Ref:</p>			
<p>lighting system</p>				
<p>wiper system</p>				
<p>accelerator system</p>				
<p>electric warning system</p>				
<p>direction control system</p>				
<p>hydraulic auxiliary system</p>				
<p>speed governing system</p>				
<p>starting system</p>				
<p>charging system</p>				
<p>traction control system</p>				
<p>electric drive, hydraulic and steering motors</p>				
<p>monitoring and instrumentation system</p>				

*However, you must prove to your assessor that you have the necessary knowledge and understanding to be able to perform competently in respect of **all** the systems listed above.

Simulated activities **will be** acceptable to assess candidate's removal and replacement competence on no more than **1** occasion.

<p>ASSESSOR SIGNATURE:</p>	<p>PIN NO:</p>	<p>DATE:</p>
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UNIT REF: LT03K	UNIT TITLE: KNOWLEDGE OF REMOVING AND REPLACING LIFT TRUCK ELECTRICAL UNITS AND COMPONENTS
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Level: 2	Route: Knowledge	Credit Value: 6	GLH: 45
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Mapping: This unit is mapped to the IMI NOS LT03

Rationale:

This unit enables the learner to develop an understanding of the principles, construction and operation and testing methods of common electrical and electronic systems and components. It also covers the procedures involved in the removal and replacement of system components and the evaluation of their performance.

LEARNING OUTCOMES	ASSESSMENT CRITERIA
<p>The Learner will:</p> <p>1. Understand lift truck electrical and electronic principles</p>	<p>The Learner can:</p> <p>1.1. Identify electrical symbols and units found in lift truck circuits</p> <p>1.2. Describe how to interpret simple lift truck wiring diagrams</p> <p>1.3. Describe the operation of key lift truck circuit protection devices and why these are necessary</p> <p>1.4. Describe lift truck earthing principles and earthing methods</p> <p>1.5. Identify the use of different cables and connectors used in lift truck circuits</p> <p>1.6. Describe the operation of electrical and electronic sensors, actuators and their application</p> <p>1.7. Describe common types of testing methods used to check the operation of electrical and electronic circuits and their purpose</p> <p>1.8. Describe the key electrical/electronic control principles that are related to lift truck electrical circuits</p> <p>1.9. State common terms used in lift truck electrical circuits</p>
<p>2. Understand how lift truck batteries, starting and charging systems operate</p>	<p>2.1. Identify lift truck batteries, starting and charging system components</p> <p>2.2. Describe the construction and operation of lift truck batteries, starting and charging system components</p> <p>2.3. Compare batteries, starting and charging system components and assemblies against alternatives to identify differences in construction and operation</p> <p>2.4. State common terms used in conjunction with lift truck batteries, starting and charging systems</p>

<p>3. Understand how lift truck auxiliary electrical systems operate</p>	<p>3.1. Identify lift truck auxiliary system components</p> <p>3.2. Describe the construction and operation of lift truck auxiliary systems</p> <p>3.3. Compare key auxiliary system components and assemblies against alternatives to identify differences in construction and operation</p> <p>3.4. State common terms used in lift truck auxiliary system design</p>
<p>4. Understand how to check, replace and test lift truck batteries, starter, charging and auxiliary electrical units components and systems</p>	<p>4.1. Describe how to remove and replace lift truck batteries, starter, charging and auxiliary electrical system units and components</p> <p>4.2. Describe common types of testing methods used to check the operation of batteries, starter, charging and auxiliary electrical systems and their purpose</p> <p>4.3. Describe how to evaluate the performance of replacement units against lift truck specification</p> <p>4.4. Describe common faults found in lift truck batteries, starter, charging and auxiliary electrical systems and their causes</p>

Content to Include:

Electrical and electronic principles and electrical circuits

- a. Electrical units:
 - i. volt (electrical pressure)
 - ii. ampere (electrical current)
 - iii. Ohm (electrical resistance)
 - iv. watt (power)
- b. The requirements for an electrical circuit:
 - i. battery
 - ii. cables
 - iii. switch
 - iv. current consuming device
 - v. continuity
- c. The direction of current flow and electron flow.
- d. Series and parallel circuits to include:
 - i. current flow
 - ii. voltage of components
 - iii. volt drop
 - iv. resistance
 - v. the effect on circuit operation of open circuit component(s)
- e. Earth and insulated return systems.
- f. Cable sizes and colour codes.
- g. Different types of connectors, terminals and circuit protection devices.
- h. Common electrical and electronic symbols.
- i. The meaning of:
 - i. short circuit
 - ii. open circuit
 - iii. bad earth
 - iv. high resistance
 - v. electrical capacity

Content to Include:

j. The principles Lift Truck electronic systems and component.

Lift Truck wiring diagrams

- a. Interpret Lift Truck wiring diagrams to include:
- i. Lift Truck lighting
 - ii. auxiliary circuits
 - iii. starting and charging systems
 - iv. traction circuits

Operation of batteries and battery charging systems

- a. The construction and operation of Lift Truck batteries including:
- i. starter and traction batteries
 - ii. low maintenance and maintenance free
 - iii. lead acid types
 - iv. cells
 - v. separators
 - vi. plates
 - vii. electrolyte
- b. The operation of the Lift Truck charging system:
- i. alternator
 - ii. rotor
 - iii. stator
 - iv. slip ring
 - v. brush assembly
 - vi. three phase output
 - vii. diode rectification pack
 - viii. voltage regulation
 - ix. phased winding connections
 - x. cooling fan
 - xi. alternator drive systems
- c. The operation of Lift Truck traction batteries and chargers.

Components and operation of engine starting systems

- a. The layout, construction and operation of engine starting systems: inertia and pre-engaged principles.
- b. The function and operation of the following components:
- i. inertia and pre-engaged starter motor
 - ii. starter ring gear
 - iii. pinion
 - iv. starter solenoid
 - v. ignition/starter switch
 - vi. starter relay (if appropriate)
 - vii. one-way clutch (pre-engaged starter motor)

Components and operation of lighting and auxiliary systems

- a. The construction and operation of lift truck auxiliary systems to include:
- i. lighting systems
 - ii. accelerator systems
 - iii. direction control systems
 - iv. speed governing devices
 - v. traction control systems
 - vi. axle stability systems
 - vii. electric drive, hydraulic and steering motors
 - viii. monitoring and instrumentation systems

Content to Include:

- b. Function and construction of electrical components including:
 - i. front and tail lamps
 - ii. work lamps
 - iii. lighting switch
 - iv. anti theft devices
 - v. manual locking systems
 - vi. interior lights
 - vii. directional indicators
 - viii. circuit relays
 - ix. bulb types
 - x. fan and heater
 - xi. circuit protection
- c. The circuit diagram and operation of components for:
 - i. side and tail lamps
 - ii. work lamps
 - iii. interior lamps
 - iv. direction indicators
 - v. anti theft devices
- d. The statutory requirements for Lift Truck lighting when using a Lift Truck on site/ road.

Safety procedures and precautions when working on electrical and electronic systems

- a. The safety precautions when working on electrical and electronic systems to include:
 - i. disconnection and connection of battery
 - ii. avoidance of short circuits
 - iii. power surges
 - v. prevention of electric shock
 - vi. protection of electrical and electronic components
 - vii. protection of circuits from overload or damage

Testing and inspection techniques used for electrical and electronic systems

- a. The set-up and use of:
 - i. digital and analogue multi-meters
 - ii. voltmeter
 - iii. ammeter
 - iv. ohmmeter
 - v. oscilloscope
 - vi. manufacturer's dedicated test equipment
- b. Electrical and electronic checks for electrical and electronic systems to include:
 - i. connections
 - ii. security
 - iii. functionality
 - iv. performance to specifications
 - v. continuity, open circuit
 - vi. short circuit
 - vii. high resistance
 - viii. volt drop
 - ix. current consumption
 - x. output patterns (oscilloscope)

Content to Include:
Common faults associated with electrical and electronic components and systems

- a. Symptoms and faults associated with electrical and electronic systems to include:
 - i. high resistance
 - ii. loose and corroded connections
 - iii. short circuit
 - iv. excessive current consumption
 - v. open circuit
 - vi. malfunction
 - vii. poor performance
 - viii. battery faults to include flat battery
 - ix. failure to hold charge
 - x. low state of charge
 - xi. overheating

Procedures for dismantling, removal and replacement of electrical and electronic units and components

- a. The preparation, testing and use of:
 - i. tools and equipment
 - ii. electrical meters and equipment used for dismantling
 - iii. removal and replacement of electrical and electronic systems and components
- b. Appropriate safety precautions:
 - i. PPE
 - ii. Lift Truck protection when dismantling
 - iii. removal and replacing electrical and electronic components and systems
- c. The importance of logical and systematic processes.
- d. Preparation of replacement units for re-fitting or replacement electrical and electronic components and systems.
- e. The reasons why replacement components and units must meet the original specifications (OES) – warranty requirements, to maintain performance, safety requirements.
- f. Refitting procedures.
- g. The inspection and testing of units and systems to ensure compliance with manufacturer's, legal and performance requirements.
- h. Inspection and re-instatement of the Lift Truck following repair to ensure:
 - i. customer satisfaction
 - ii. cleanliness of Lift Truck interior and exterior
 - iii. security of components and fittings
 - iv. re-instatement of components and fittings



Learner Name:

UNIT REF: LT04C	UNIT TITLE: COMPETENCY IN REMOVING AND REPLACING LIFT TRUCK MECHANICAL HANDLING, CHASSIS UNITS AND COMPONENTS
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Level: 2	Route: Competence	Credit Value: 10	GLH: 90
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Mapping: This unit is mapped to the IMI NOS LT04

Rationale:
 This unit allows the learner to develop the skills required to remove and replace lift truck mechanical handling, hydraulic, steering and braking units. It also covers the evaluation of performance of the replaced units and systems

LEARNING OUTCOMES	ASSESSMENT CRITERIA	Ref No	Date
The Learner will:	The Learner can:		
1. Be able to work safely when carrying out removal and replacement activities	1.1. Wear suitable personal protective equipment and use suitable coverings throughout all lift truck chassis unit and component removal and replacement activities 1.2. Work in a way which minimises the risk of damage or injury to the lift truck, people and the environment		
2. Be able to use relevant information to carry out the task	2.1. Select suitable sources of technical information to support lift truck chassis unit and component removal and replacement activities including: <ul style="list-style-type: none"> a. technical data b. removal and replacement procedures c. legal requirements 2.2. Interpret technical information to support lift truck chassis unit and component removal and replacement activities		
3. Be able to use appropriate tools and equipment	3.1. Select the appropriate tools and equipment necessary for removal and replacement of lift truck chassis systems 3.2. Check that equipment has been calibrated to meet manufacturers' and legal requirements 3.3. Use the correct tools and equipment in the way specified by manufacturers to remove and replace lift truck chassis systems		
4. Be able to carry out removal and replacement of lift truck chassis units and components.	4.1. Remove and replace the lift truck's chassis systems and components, adhering to the correct specifications and tolerances and following: <ul style="list-style-type: none"> a. manufacturer's approved removal and replacement methods b. recognised researched repair methods c. health and safety requirements 4.2. Ensure that replaced or reassembled lift truck chassis units and components conform to the operating specification and any legal requirements 4.3. Use suitable testing methods to evaluate the performance of the reassembled system 4.4. Work to the specified timescale for the activity		



<p>5. Be able to record information and make suitable recommendations</p>	<p>5.1. Produce work records that are accurate, complete and passed to the relevant person(s) promptly in the format required</p> <p>5.2. Make suitable and justifiable recommendations for cost effective repairs</p> <p>5.3. Identify and report any expected delays in completion to the relevant person(s) promptly in the format required.</p> <p>5.4. Record and report any additional faults noticed during the course of their work promptly in the format required</p>		
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EVIDENCE REQUIREMENTS

<p>1. You must produce evidence of removing and replacing 4 different units or components, which must include items from:</p>	<p>Evidence Ref:</p>
<ul style="list-style-type: none"> • mechanical handling system 	
<ul style="list-style-type: none"> • hydraulic system 	
<ul style="list-style-type: none"> • steering system 	
<ul style="list-style-type: none"> • braking system 	
<p>Your evidence must include demonstration of competence in each aspect of mechanical, electrical and hydraulic/fluid units or component removal and replacement.</p>	<p>Evidence Ref:</p>
<p>2. You must be observed in your normal workplace on at least 1 occasion removing and replacing units and components from 2 of the following systems:</p>	<p>Observation Ref:</p>
<ul style="list-style-type: none"> • mechanical handling system 	
<ul style="list-style-type: none"> • hydraulic system 	
<ul style="list-style-type: none"> • steering system 	
<ul style="list-style-type: none"> • braking system 	

Evidence from simulated activities is **not** acceptable for this unit.

<p>ASSESSOR SIGNATURE:</p>	<p>PIN NO:</p>	<p>DATE:</p>
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UNIT REF: LT04K	UNIT TITLE: KNOWLEDGE OF REMOVING AND REPLACING LIFT TRUCK MECHANICAL HANDLING, CHASSIS UNITS AND COMPONENTS
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Level: 2	Route: Knowledge	Credit Value: 6	GLH: 45
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Mapping: This unit is mapped to the IMI NOS LT04

Rationale: This unit enables the learner to develop an understanding of the construction and operation of mechanical handling, hydraulic, steering and braking systems. It also covers the procedures involved in the removal and replacement of system components and the evaluation of their performance.

LEARNING OUTCOMES	ASSESSMENT CRITERIA
The Learner will:	The Learner can:
1. Understand how lift truck mechanical handling and hydraulic systems operate	1.1. Identify lift truck mast and carriage assemblies including the hydraulic system components 1.2. Describe the construction and operation of lift truck mast and carriage assemblies including the hydraulic system components 1.3. Compare key lift truck mast and carriage assemblies including the hydraulic system components against alternatives to identify differences in construction and operation 1.4. Identify the key engineering principles that are related to lift truck mast and carriage assemblies including the hydraulic system components a. moments b. hydraulic power c. work and power d. stress and strain 1.5. State common terms used in lift truck mast and carriage assemblies including the hydraulic system
2. Understand how lift truck steering systems operate	2.1. Identify lift truck steering units components and systems 2.2. Describe the construction and operation of lift truck steering units components and systems 2.3. Compare key lift truck steering system components and assemblies against alternatives to identify differences in construction and operation 2.4. Identify the key engineering principles that are related to lift truck steering systems including: a. steering geometry b. steering angles c. hydraulics d. stress and strain 2.5. State common terms used in lift truck steering system design

<p>3. Understand how lift truck braking systems operate</p>	<p>3.1. Identify lift truck braking system components</p> <p>3.2. Describe the construction and operation of lift truck braking system units and components</p> <p>3.3. Compare key lift truck braking system components and assemblies against alternatives to identify differences in construction and operation</p> <p>3.4. Identify the key engineering principles that are related to lift truck braking systems</p> <ol style="list-style-type: none"> a. laws of friction b. hydraulic machines c. properties of fluids d. braking efficiency <p>3.5. State common terms used in lift truck braking system design</p>
<p>4. Understand how to check, replace and test lift truck mast and carriage, hydraulics, steering and braking systems units components</p>	<p>4.1. Describe how to remove and replace lift truck mast and carriage, hydraulics, steering and braking system components</p> <p>4.2. Describe common types of testing methods used to check the operation of mast and carriage, hydraulics, steering and braking systems and their purpose</p> <p>4.3. Describe how to evaluate the performance of replacement units against lift truck specification</p> <p>4.4. Describe common faults found in lift truck mast and carriage, hydraulics, steering and braking systems and their causes</p>

Content to Include:

Tyre technology and markings

a. The construction of different types of tyre:

- i. super-elastic
- ii. pneumatic
- iii. tread patterns
- iv. tyre mixing regulations
- v. tyre applications
- vi. solid
- vii. cushion
- viii. POBs and anti marking

b. Tyre markings:

- i. tyre and wheel size markings
- ii. tread wear markings

Types of wheel and rim construction

a. Wheel construction:

- i. press ons
- ii. SIT
- iii. spilt rim

Content to Include:
Types of wheel bearing arrangement

- a. Types of wheel bearing arrangements:
 - i. non-driving and driven wheels
 - ii. fully floating
 - iii. three quarter floating
 - iv. semi floating axles
- b. Types of bearing used for wheel bearing arrangements:
 - i. roller
 - ii. taper roller
 - iii. needle
 - iv. ball and plain

Operation of Lift Truck drum and disc brake systems

- a. The construction and operation of drum brakes:
 - i. leading and trailing shoe construction
 - ii. self-servo action
 - iii. automatic adjusters
 - iv. backing plates
 - v. parking brake system
- b. The construction and operation of disc brakes:
 - i. disc pads
 - ii. calliper
 - iii. brake disc
 - iv. wet disc
 - v. disc pad retraction
 - vi. parking brake system
 - vii. electrical and electronic components
 - viii. wear indicators and warning lamps
- c. The construction and operation of the hydraulic braking system:
 - i. single line layout
 - ii. master cylinders
 - iii. wheel cylinders
 - iv. disc brake calliper & pistons
 - v. brake pipe
 - vi. brake servo
 - vii. warning lights
 - viii. parking brakes
 - ix. equalising valves
- d. The principles and components of electronic ABS systems, electrical and electronic components.
- e. The requirements and hazards of brake fluid:
 - i. boiling point
 - ii. hygroscopic action
 - iii. manufacturer's change periods
 - iv. fluid classification and rating
 - v. potential to damage paint surfaces
- f. Terms associated with mechanical and hydraulic braking systems:
 - i. braking efficiency
 - ii. brake fade
 - iii. brake balance

Operation of suspension systems

- a. The layout and components of axle mounting systems:
 - i. solid axle mounting
 - ii. swinging axle with mounting blocks

Content to Include:
Operation of Full power and power assisted steering systems

- a. The components and layout of hydraulic power steering systems:
 - i. piston and power cylinders
 - ii. drive systems and pumps
 - iii. hydraulic valve (rotary, spool and flapper type)
 - iv. hydraulic fluid
- b. The advantages of power assisted steering.
- c. The operation of hydraulic power steering.
- d. The principles of electronic power steering systems.

Operation of Lift Truck hydraulic systems

- a. Construction and operation of hydraulic systems
 - i. traction motors
 - ii. hydraulic motors
 - iii. steer motors
 - iv. actuators
 - v. cylinders
 - vi. valves
 - vii. pipes
 - viii. filters

Operation of Lift Truck mechanical handling systems

- a. Construction and operation of mechanical handling systems

Hydraulics

Pumps

Valve blocks

Circuits

Circuit diagrams

Pressures and flows

Filters

Rams – displacement and vented

Control systems

Faults

Overload and safety precautions

Mechanical

Mast types – duplex, triplex, full free, reach, boom/telescopic

Mast design

Lift chain design

Fork design

Roll over protection systems (ROPS) – legal requirements

Falling object protection systems (FOPS) – legal requirements

Attachments – design and use

The testing of Lift Truck chassis systems

- a. The procedures used for inspecting the serviceability and condition of:
 - i. tyres & wheels
 - ii. steering
 - iii. braking systems
 - iv. hydraulic systems
 - v. mechanical handling systems
- b. The use of equipment used for testing of Lift Truck chassis systems including:
 - i. brake roller tester
 - ii. manufacturer's dedicated equipment
 - iii. specialised equipment
 - vi. electrical testing equipment (multi-meters)
 - vii. pressure gauges

Content to Include:
Common faults associated with Lift Truck chassis systems

- a. The defects associated with tyres and wheels:
 - i. abnormal tyre wear
 - ii. cuts
 - iii. side wall damage
- b. Steering system defects to include:
 - i. uneven tyre wear
 - ii. uneven wear
 - iii. flats on tread
 - iv. steering vibrations
 - v. wear in linkage
 - vi. damage linkage
 - vii. incorrect wheel alignment
 - viii. incorrect steering geometry
- c. Braking system defects:
 - i. worn shoes or pads
 - ii. worn or scored brake surfaces
 - iii. abnormal brake noises
 - iv. brake judder
 - v. fluid contamination of brake surfaces/ foreign objects
 - vi. fluid leaks
 - vii. pulling to one side
 - viii. poor braking efficiency
 - ix. lack of servo assistance
 - x. brake drag
 - xi. brake grab
 - xii. brake fade
- d. Hydraulic system defects
 - i. leaks
 - ii. creep
 - iii. noise (cavitation)
 - iv. slow actuation
 - v. overheating
 - vi. no lift tilt or sideshift
- e. Mechanical handling defects
 - i. alignment
 - ii. noisy operation
 - iii. unacceptable wear
 - iv. non-operation
 - v. leaks
 - vi. creep
 - vii. cracked welds

Procedures for dismantling, removal and replacement of chassis system components

- a. The preparation:
 - i. testing and use of tools and equipment
 - ii. electrical meters and equipment used for dismantling
 - iii. removing and replacing chassis systems and components
- b. Appropriate safety precautions:
 - i. PPE
 - ii. Lift Truck protection when dismantling
 - iii. removing and replacing chassis systems and components
- c. The importance of logical and systematic processes.
- d. The inspection and testing of chassis systems and components.
- e. The preparation of replacement units for re-fitting or replacement of chassis systems or components



Content to Include:

- f. The reasons why replacement components and units must meet the original specifications (OES):
 - i. warranty requirements
 - ii. to maintain performance
 - iii. safety requirements
- g. Refitting procedures.
- h. The inspection and testing of units and systems to ensure compliance with manufacturer's, legal and performance requirements.
- i. The inspection and re-instatement of the Lift Truck following repair to ensure customer satisfaction:
 - i. cleanliness of Lift Truck interior and exterior
 - ii. security of components and fittings
 - iii. re-instatement of components and fittings



UNIT REF: LT0506K	UNIT TITLE: KNOWLEDGE OF INSPECTING LIFT TRUCKS
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Level: 2	Route: Knowledge	Credit Value: 3	GLH: 20
Mapping: This unit is mapped to the IMI NOS LT05 and LT06			
Rationale: This unit enables the learner to develop an understanding of carrying out a range of inspections on lift trucks using a variety of prescribed testing and inspection methods			

LEARNING OUTCOMES	ASSESSMENT CRITERIA
The Learner will:	The Learner can:
1. Understand how to carry out inspections on lift trucks using a range of methods	1.1. Explain the difference between the various prescribed lift truck inspection methods 1.2. Identify the different systems to be inspected when using the prescribed inspection methods 1.3. Identify the procedures involved in carrying out the systematic inspection of the prescribed inspection methods on lift trucks 1.4. Identify correct conformity of lift truck systems and condition during lift truck inspection 1.5. Compare the test and inspection results against lift truck specification and legal requirements 1.6. Explain how to record and complete the inspection results in the format required 1.7. Identify the recommendations that can be made based on results of lift truck inspections 1.8. Explain the implications of failing to carry out lift truck inspection activities correctly 1.9. Explain the implications of signing workplace documentation and lift truck records 1.10. Explain the legislation relevant to the activities undertaken in inspecting lift trucks 1.11. Explain the procedure for the reporting of damage to lift truck components and units outside the normal inspection items

Content to Include:
Different types of Lift Truck inspection

- a. The difference between various types of prescribed inspection methods for Lift trucks including:
 - i. pre-work and post-work
 - ii. pre-delivery and pre-purchase
 - iii. maintenance inspection
 - iv. thorough examination
 - v. thorough examination and test
 - vi. LOLER/PUWER test
 - vii. safety
 - viii. post accident
 - ix. pre and post hire

Pre and post work Lift Truck inspections and record findings

- a. Lift Truck inspection techniques for different types of inspection including:
 - i. systematic inspections
 - ii. aural
 - iii. visual and functional assessments on engine
 - iv. engine and power systems
 - v. chassis systems
 - vi. mechanical handling systems
 - vii. wheels and tyres
 - viii. transmission system
 - ix. electrical and electronic systems
 - x. exterior Lift Truck body
 - xi. Lift Truck interior
- b. The procedure for inspection of the Lift Truck for damage, corrosion, fluid leaks, wear, security, mounting security and condition to include:
 - i. engines and engine systems/power unit
 - ii. chassis systems
 - iii. brakes
 - iv. steering
 - v. mechanical handling equipment
 - vi. wheels
 - vii. tyres
 - viii. body panels (stressed and non-stressed)
 - ix. ballast weights
 - x. electrical and electronic systems and components
 - xi. instruments
- c. How to prepare and use appropriate inspection equipment and tools including:
 - i. emission testing
 - ii. brake testing
 - iii. chain and fork testing
 - iv. wheel alignment
 - v. torque setting
 - vi. specialist diagnostic equipment
- d. Inspection procedures following inspection checklists.
- e. How to check conformity to manufacturer's specifications and legal requirements.
- f. How to test the operation of Lift Truck systems and Lift Truck condition including workshop based tests and if appropriate/applicable road tests.



Content to Include:

- g. The completion of:
 - i. documentation
 - ii. inspection records
 - iii. job cards
 - iv. Lift Truck records
- h. Make recommendations based on results of Lift Truck inspections.
- i. The implications of not carrying out Lift Truck inspections correctly including:
 - i. legal aspects
 - ii. safety aspects
 - iii. financial aspects
 - iv. customer retention
 - v. customer relationships



Learner Name:

UNIT REF: LT05C	UNIT TITLE: COMPETENCY IN INSPECTING LIFT TRUCK USING PRESCRIBED METHODS
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Level: 2	Route: Competence	Credit Value: 4	GLH: 30
Mapping: This unit is mapped to IMI NOS LT05			
Rationale: This unit allows the learner to develop skills to carry out a range of lift truck inspections using a variety of prescribed testing and inspection methods.			

LEARNING OUTCOMES	ASSESSMENT CRITERIA	Ref No	Date
The Learner will:	The Learner can:		
1. Be able to work safely when carrying out lift truck inspections using prescribed methods	1.1. Wear suitable personal protective equipment and use suitable coverings throughout all lift truck inspection activities 1.2. Work in a way which minimises the risk of damage or injury to the lift truck, people and the environment		
2. Be able to use relevant information to carry out the task	2.1. Select suitable sources of technical information to support lift truck inspection activities including: a. technical data b. inspection procedures c. legal requirements 2.2. Interpret technical information to support lift truck inspection activities		
3. Be able to use appropriate tools and equipment	3.1. Select the appropriate tools and equipment necessary for carrying out a range of inspections on lift truck systems 3.2. Check that equipment has been calibrated to meet manufacturers' and legal requirements 3.3. Use the correct tools and equipment in the way specified by manufacturers when carrying out a range of inspections on lift truck systems		
4. Be able to carry out lift truck inspections using prescribed methods	4.1. Carry out lift truck inspections using prescribed methods, adhering to the correct specifications and tolerance and following: a. manufacturer's approved inspection methods b. recognised researched inspection methods c. health and safety requirements d. prescribed documentation 4.2. Check that inspected lift truck conforms to the operating specification and any legal requirements 4.3. Ensure any comparison of the lift truck against specification accurately identifies any: a. differences from the lift truck specification b. lift truck appearance and condition faults 4.4. Use suitable testing methods to evaluate the performance of the inspected systems 4.5. Work to the specified timescale for the activity		



<p>5. Be able to record information and make suitable recommendations</p>	<p>5.1. Produce work records that are accurate, complete and passed to the relevant person(s) promptly in the format required</p> <p>5.2. Make suitable and justifiable recommendations for future action based upon the inspection</p> <p>5.3. Identify and report any expected delays in completion to the relevant person(s) promptly in the format required.</p> <p>5.4. Record and report any additional faults noticed during the course of their work promptly in the format required</p>		
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EVIDENCE REQUIREMENTS

<p>1. You must produce evidence of carrying out the different inspections from the following:</p>	<p>Evidence Ref:</p>
<ul style="list-style-type: none"> • 2 pre-work inspections 	
<ul style="list-style-type: none"> • 2 post-work inspections 	
<p>2. You must be observed by your assessor in your normal workplace carrying out an inspection on at least 1 occasion.</p>	<p>Observation Ref:</p>

Evidence from simulated activities is **not** acceptable for this unit.

<p>ASSESSOR SIGNATURE:</p>	<p>PIN NO:</p>	<p>DATE:</p>
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Learner Name:

UNIT REF: G8C	UNIT TITLE: COMPETENCY IN IDENTIFYING AND AGREEING MOTOR VEHICLE CUSTOMER SERVICE NEEDS
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Level: 3	Route: Competence	Credit Value: 5	GLH: 40
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Mapping: This unit is mapped to the IMI NOS G8

Rationale: This unit helps the learner to develop competency in order to: gain information from customers on their perceived needs; give advice and information and agree a course of action; contract for the agreed work and complete all necessary records and instructions.

LEARNING OUTCOMES	ASSESSMENT CRITERIA	Ref No	Date
The Learner will:	The Learner can:		
1. Be able to obtain relevant information from the customer	1.1. Obtain and interpret sufficient, relevant information, from the customer to make an assessment of their needs. 1.2. Clarify customer and vehicle needs by referring to vehicle data and operating procedures		
2. Be able to provide relevant information to the customer	2.1. Provide customers with accurate, current and relevant advice and information, in a form that the customer will understand. 2.2. Demonstrate techniques which encourage customers to ask questions and seek clarification during conversation		
3. Be able to agree work undertaken with the customer	3.1. Summarise and record work agreed with the customer, before accepting the vehicle. 3.2. Implement confirmation of the agreement by ensuring customer understanding		
4. Be able to ensure recording systems are implemented correctly	4.1. Use recording systems which are accurate and complete, in the required format and signed by the customer where necessary 4.2. Perform the next stage in the process by passing on completed records to the correct person promptly. 4.3. Demonstrate correct procedures for customer approval where the contracted agreement is likely to be exceeded.		

EVIDENCE REQUIREMENTS

1. You must produce evidence, including records, to show that you have dealt with 3 different customers .	Evidence Ref		
2. You must be observed by your assessor in your normal workplace dealing with at least 1 customer	Observation Ref:		

ASSESSOR SIGNATURE:	PIN NO:	DATE:
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UNIT REF: G8K	UNIT TITLE: KNOWLEDGE OF HOW TO IDENTIFY AND AGREE MOTOR VEHICLE CUSTOMER SERVICE NEEDS
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Level: 3	Route: Knowledge	Credit Value: 5	GLH: 45
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Mapping: This unit is mapped to the IMI NOS G8

Rationale: This unit enables the learner to develop an understanding of how to gain: information from customers on their perceived needs; give advice and information and agree a course of action; contract for the agreed work and complete all necessary records and instructions.

LEARNING OUTCOMES	ASSESSMENT CRITERIA
The Learner will:	The Learner can:
1. Understand legislative and organisational requirements and procedures	1.1. Describe the fundamental legal requirements of current consumer legislation and the consequences of their own actions in respect of this legislation 1.2. Describe the content and limitations of company and product warranties for the vehicles dealt with by their company 1.3. Explain the limits of their own authority for accepting vehicles 1.4. Explain the importance of keeping customers informed of progress 1.5. Describe their workplace requirements for the completion of records 1.6. Explain how to complete and process all the necessary documentation
2. Understand how to communicate and care for customers	2.1. Explain how to communicate effectively with customers 2.2. Describe how to adapt your language when explaining technical matters to non-technical customers 2.3. Explain how to use effective questioning techniques 2.4. Describe how to care for customers and achieve customer satisfaction
3. Understand company products and services	3.1. Describe the range of options available to resolve vehicle problems 3.2. Describe the range and type of services offered by their company 3.3. Explain the effect of resource availability upon the receipt of customer vehicles and the completion work 3.4. Explain how to access costing and work completion time information

Content:
Organisational requirements

- a. Explain the organisation's terms and conditions applicable to the acceptance of customer lift trucks.
- b. Explain the content and limitations of lift truck and component warranties for the lift trucks dealt with by your organisation.
- c. Detail what, if any, limits there are to the authority for accepting lift trucks.
- d. Detail why it is important to keep customers advised of progress and how this is achieved within the organisation.
- e. Detail the organisation's procedures for the completion and processing of documentation and records, including payment methods and obtaining customer signatures as applicable.

Principles of customer communication and care.

- a. First Impressions.
- b. Listening skills – 80:20 ratio.
- c. Eye contact and smiling.
- d. Showing interest and concern.
- e. Questioning techniques and customer qualification.
- f. Giving clear non-technical explanations.
- g. Confirming understanding (statement/question technique, reflective summary).
- h. Written communication – purpose, content, presentation and style.
- i. Providing a high quality service – fulfilling (ideally exceeding) customer expectations within agreed time frames.
- j. Obtaining customer feedback and corrective actions when dissatisfaction expressed.
- k. Dealing with complaints.

Company products and services

- a. Service standards
 - i. national
 - ii. manufacturer
 - iii. organisational
- b. The range and type of services offered by the organisation.
 - i. diagnostic.
 - ii. servicing.
 - iii. repair.
 - iv. warranty.
 - v. MOT testing.
 - vi. fitment of accessories/enhancements.
 - vii. internal.
- c. The courses of action available to resolve customer problems.
 - i. the extent and nature of the work to be undertaken.
 - ii. the terms and conditions of acceptance.
 - iii. the cost.
 - iv. the timescale.
 - v. required payment methods.
- d. Effect of resource availability upon the receipt of customer lift trucks and the completion of work.
 - i. levels and availability of equipment.
 - ii. levels and availability of technicians.
 - iii. workshop loading systems.
- e. How to access costing and work completion time information.
 - i. manuals.
 - ii. computer based.

Lift truck Information Systems, Servicing and Repair Requirements

- a. Accessing technical data including diagnostics.
- b. Servicing to manufacturer requirements/standards.
- c. Repair/operating procedures.
- d. MOT standards/requirements.
- e. Quality controls – interim and final.
- f. Requirements for cleanliness of lift truck on return to customer.
- g. Handover procedures.



Content: contd

Consumer legislation: To include:

- a. Consumer protection
- b. Sale of goods
- c. Data protection
- d. Product liability
- e. Health and safety
- f. Discrimination



Learner Name:

UNIT REF: LT12C	UNIT TITLE: COMPETENCY IN REMOVING AND REPLACING LIFT TRUCK DRIVELINE UNITS AND COMPONENTS
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Level: 2	Route: Competence	Credit Value: 10	GLH: 90
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Mapping: This unit is mapped to IMI NOS LT12

Rationale:
This unit allows the learner to develop skills to remove and replace lift truck driveline units and components. It also covers the evaluation of performance of the replaced units and systems

LEARNING OUTCOMES	ASSESSMENT CRITERIA	Ref No	Date
The Learner will:	The Learner can:		
1. Be able to work safely when carrying out removal and replacement activities	1.1. Wear suitable personal protective equipment and coverings throughout all driveline unit and component removal and replacement activities 1.2. Work in a way which minimises the risk of damage or injury to the lift truck, people and the environment		
2. Be able to use relevant information to carry out the task	2.1. Select suitable sources of technical information to support lift truck driveline unit and component removal and replacement activities including: a. technical data b. removal and replacement procedures c. legal requirements 2.2. Interpret technical information to support lift truck driveline unit and component removal and replacement activities		
3. Be able to use appropriate tools and equipment	3.1. Select the appropriate tools and equipment necessary for removal and replacement of driveline units and components 3.2. Check that equipment has been calibrated to meet manufacturers' and legal requirements 3.3. Use the correct tools and equipment in the way specified by manufacturers to remove and replace lift truck driveline units and components		
4. Be able to carry out removal and replacement of lift truck driveline units and components.	4.1. Remove and replace the lift truck driveline units and components, adhering to the correct specifications and tolerances and following: a. the manufacturer's approved removal and replacement methods b. recognised researched repair methods c. health and safety requirements. 4.2. Check that the repaired or replaced lift truck driveline units and components conform to the operating specification and any legal requirements 4.3. Record and report any additional lift truck faults noticed during the course of the work promptly and in the format required 4.4. Use suitable testing methods to evaluate the performance of the reassembled system 4.5. Work to the specified timescale for the activity		



<p>5. Be able to record information and make suitable recommendations</p>	<p>5.1. Produce work records that are accurate, complete and passed to the relevant person(s) promptly in the format required</p> <p>5.2. Make suitable and justifiable recommendations for cost effective repairs</p> <p>5.3. Identify and report any expected delays in completion to the relevant person(s) promptly in the format required.</p> <p>5.4. Record and report any additional faults noticed during the course of their work promptly in the format required</p>		
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EVIDENCE REQUIREMENTS

<p>1. You must produce evidence of removing and replacing 4 different units or components* from the list below. Evidence must include mechanical, electrical and hydraulic/fluid units or components.</p>	<p>Evidence Ref:</p>
<ul style="list-style-type: none"> • powershift unit 	
<ul style="list-style-type: none"> • torque converter 	
<ul style="list-style-type: none"> • control valves 	
<ul style="list-style-type: none"> • hubs and bearings 	
<ul style="list-style-type: none"> • driveline shafts 	
<p>2. You must be observed by your assessor in your normal workplace on at least 1 occasion removing and replacing units and components from one of the systems</p>	<p>Observation Ref</p>

*However, you must prove to your assessor that you have the necessary knowledge and understanding to be able to perform competently in respect of **all** the systems listed above.

Evidence from simulated activities is **not** acceptable for this unit.

<p>ASSESSOR SIGNATURE:</p>	<p>PIN NO:</p>	<p>DATE:</p>
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UNIT REF: LT12K	UNIT TITLE: KNOWLEDGE OF REMOVING AND REPLACING LIFT TRUCK DRIVELINE UNITS AND COMPONENTS
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Level: 2	Route: Knowledge	Credit Value: 6	GLH: 45
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Mapping: This unit is mapped to the IMI NOS LT12

Rationale: This unit enables the learner to develop an understanding of the construction and operation of lift truck driveline units and systems. It also covers the procedures involved in the removal and replacement of system components and the evaluation of their performance

LEARNING OUTCOMES	ASSESSMENT CRITERIA
The Learner will:	The Learner can:
1. Understand how lift truck driveline systems operate	1.1. Identify lift truck driveline components 1.2. Describe the construction and operation of lift truck driveline systems 1.3. Compare key lift truck driveline components and assemblies against alternatives to identify differences in construction and operation 1.4. Identify the key engineering principles that are related to lift truck driveline systems <ul style="list-style-type: none"> a. gear ratios b. simple stresses c. torque calculations 1.5. State common terms used in lift truck driveline design
2. Understand how to check, replace and test lift truck driveline units and systems	2.1. Describe how to remove and replace lift truck driveline units and components 2.2. Describe common types of testing methods used to check the operation of lift truck driveline units and components and their purpose 2.3. Describe how to evaluate the performance of replacement units against lift truck specification 2.4. Describe common faults found in lift truck driveline systems and their causes

Content to Include:

- a. The construction and operation of lift truck driveline systems to include:
 - i. power shift units
 - ii. hubs and bearings
 - iii. driveline shafts
 - iv. torque converters
 - v. control valves
 - vi. final drive units
 - vii. motor control units
- b. The operation of hydrostatic transmissions
- c. The reasons for fitting hydrostatic transmissions – advantages and disadvantages

The operation of power shift transmissions

- a. The reasons for fitting power shift transmissions – advantages and disadvantages
- b. The layout, construction and operation of power shift transmissions

The operation of electric transmissions

- a. The reasons for fitting electric transmissions – advantages and disadvantages
- b. The layout, construction and operation of electric transmissions
- c. Hybrid systems – advantages and disadvantages

The operation of driveline components

- a. The layout and construction of propshafts and drive shafts used in front wheel, rear wheel and four-wheel drive systems.
- b. The reasons for using flexible couplings and sliding joints in transmissions systems.
- c. The reason for using constant velocity joints in drive shafts incorporating steering mechanisms.
- d. Where fitted the construction and operation of:
 - i. universal joints
 - ii. sliding couplings
 - iii. constant velocity joints
- e. The simple stresses applied to shafts: torsional, bending and shear.
- f. The construction and operation of:
 - i. final drive units
 - ii. crown wheel & pinion
 - iii. bevel
 - iv. hypoid and helical gears
 - v. differential gears
 - vi. sun & planet gears
 - vii. lubricants
 - viii. lubrication bearings and seals
 - ix. limited slip differential
- g. The reasons for fitting a differential.
- h. Calculate final drive gear ratios.
- i. Calculate the overall gear ratio from given data (gearbox ratio x final drive ratio).

Content to Include:
The testing and inspection techniques used for lift truck transmission systems

- a. The techniques and procedures used for inspecting and testing transmissions including:
 - i. leaks
 - ii. gear selection
 - iii. oil pressures
 - iv. abnormal noise
- b. The techniques and procedures used for inspecting and testing drive line systems (prop & drive shafts, couplings) including:
 - i. security
 - ii. serviceability of rubber boots
 - iii. leaks
 - iv. alignment
 - v. balance weights (where applicable)
- c. The basic techniques used when inspecting and testing final drive systems including:
 - i. fluid levels
 - ii. leaks
 - iii. noise

The faults and symptoms associated with lift truck transmissions systems

- a. The faults and symptoms associated with transmission systems:
 - i. transmission faults
 - ii. drive line faults (propshaft, drive shaft, universal and constant velocity joints)
 - iii. final drive faults
- b. Faults and symptoms to include mechanical, electrical and hydraulic systems.

The procedures for dismantling, removal and replacement of transmission units and components

- a. The preparation, testing and use of tools and equipment, electrical meters and equipment used for dismantling removing and replacing transmission systems and components.
- b. Appropriate safety precautions:
 - i. PPE
 - ii. Lift truck protection when dismantling
 - iii. removing and replacing transmission systems and components
- c. The importance of logical and systematic processes.
- d. The inspection and testing of transmission systems and components
- e. The preparation of replacement units for re-fitting or replacement of transmission systems or components
- f. The reasons why replacement components and units must meet the original specifications (OES):
 - i. warranty requirements
 - ii. to maintain performance
 - iii. safety requirements
- g. Refitting procedures.
- h. The inspection and testing of units and system to ensure compliance with manufacturer's, legal and performance requirements.
- I. The inspection and re-instatement of the vehicle following repair to ensure customer satisfaction:
 - i. cleanliness of the lift truck interior and exterior
 - ii. security of components and fittings
 - iii. re-instatement of components and fittings



ASSESSOR COMMENTS AND FEEDBACK

Assessor's should comment and give feedback each time they observe a learner or meet with a learner to review evidence. Therefore each time an observation or review of evidence takes place the assessor should enter the date and the evidence number, and make appropriate comments and feedback. Please see the guide below for the type of comments that can be included.

- The following provides guidance as to the type of comments that can be included below.**
1. A description of the various activities being carried out by the learner for each unit.
 2. How the learner has met the Learning Outcomes for each unit.
 3. Questions that you have asked, particularly to cover Evidence Requirements, not demonstrated through performance.
 4. Questions you have asked to ascertain Essential Knowledge.
 5. Issues arising from assessment.
 6. Identification of good or poor performance.
 7. Any action required to further develop the learners knowledge and skills.
 8. Constructive feedback to the learner.

Date	Evidence Ref No.	Assessor Comments: Please ensure your comments are concise.



ASSESSOR COMMENTS AND FEEDBACK

CONTINUATION SHEET

Date	Evidence Ref No.	Assessor Comments: Please ensure your comments are concise.