

Specification

**Edexcel BTEC Level 2 and 3 Diploma in Lift Truck
Maintenance and Repair Principles (QCF)**

**Edexcel Level 2 and 3 Diploma in Lift Truck
Maintenance and Repair Competence (QCF)**

For first registration November 2011

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Qualification titles covered by this specification

This specification gives you the information you need to offer the Edexcel Principles and Competence qualifications in Lift Truck Maintenance and Repair (QCF) at Levels 2 and 3.

Qualification title	Qualification Number (QN)	Operational start date
Edexcel BTEC Level 2 Diploma in Lift Truck Maintenance and Repair Principles (QCF)	600/3571/7	01/11/2011
Edexcel Level 2 Diploma in Lift Truck Maintenance and Repair Competence (QCF)	600/3572/9	01/11/2011
Edexcel BTEC Level 3 Diploma in Lift Truck Maintenance and Repair Principles (QCF)	600/3564/X	01/11/2011
Edexcel Level 3 Diploma in Lift Truck Maintenance and Repair Competence (QCF)	600/3570/5	01/11/2011

These qualifications have been accredited within the Qualifications and Credit Framework (QCF) and are eligible for public funding as determined by the Department for Education (DfE) under Section 96 of the Learning and Skills Act 2000.

The qualification titles listed above feature in the funding lists published annually by the DfE and the regularly updated website. They will also appear on the Learning Aim Reference Application (LARA), where relevant.

You should use the QCF Qualification Number (QN), when you wish to seek public funding for your learners. Each unit within a qualification will also have a unique QCF unit reference number, which is listed in this specification.

The QCF qualification title and unit reference numbers will appear on the learners' final certification document. Learners need to be made aware of this when they are recruited by the centre and registered with Edexcel.

Key features of the Edexcel Principles and Competence qualifications in Lift Truck Maintenance and Repair (QCF) at Levels 2 and 3

These qualifications:

- are nationally recognised
- are based on the Maintenance and Repair-Lift Truck National Occupational Standards (NOS). The NOS, assessment strategy and qualification structures are owned by the Sector Skills Council, The Institute of the Motor Industry (IMI).

The Edexcel BTEC Level 2 Diploma in Lift Truck Maintenance and Repair Principles (QCF) and the Edexcel Level 2 Diploma in Lift Truck Maintenance and Repair Competence (QCF) have been approved as components in the Intermediate apprenticeship framework in Vehicle Maintenance and Repair.

The Edexcel BTEC Level 3 Diploma in Lift Truck Maintenance and Repair Principles (QCF) and the Edexcel Level 3 Diploma in Lift Truck Maintenance and Repair Competence (QCF) have been approved as components in the Advanced apprenticeship framework in Vehicle Maintenance and Repair.

What is the purpose and benefits of these qualifications?

These qualifications give learners flexible access to industry supported Level 2 and 3 skills programmes, which act as a real alternative to academic qualifications for those who prefer this style of learning and achievement. As part of apprenticeship frameworks, the qualifications support learners in providing a career pathway into jobs and training at technician level and higher.

Learners will have the opportunity to learn and demonstrate their skills, knowledge and competence in how to diagnose, test and repair lift trucks.

Who are these qualifications for?

These qualifications are for all learners aged 16 and above who are capable of reaching the required standards.

Edexcel's policy is that the qualifications should:

- be free from any barriers that restrict access and progression

- ensure equality of opportunity for all wishing to access the qualifications.

Centres should be aware that within the Level 2 qualifications in this specification, learners will be required to meet the demands of unit(s) at Level 3. Centres are advised to consider the support, guidance and opportunities they give to learners to meet the demands of the higher level units during delivery and assessment of the qualification.

What are the potential job roles for those working towards these qualifications?

- Lift truck technician
- Lift truck diagnostic technician.

What progression opportunities are available to learners who achieve these qualifications?

Learners can progress on to other Edexcel automotive apprenticeship programmes and/or related qualifications detailed in *Annexe A*. Other progression routes include; further work or work experience, academic qualification(s) such as one or more GCSEs, higher education programmes and/or Foundation Degree, or employment in a range of jobs at levels 2 and 3.

What is the qualification structure for the Edexcel BTEC Level 2 Diploma in Lift Truck Maintenance and Repair Principles (QCF)?

A minimum of 83 credits is required to achieve this qualification. 29 credits from the mandatory generic units in Group A, 44 credits from the mandatory specialist units in Group B and a minimum of 10 credits from one of the option groups in Group C.

Individual units can be found in the *Units* section.

Unit No.	Unit Reference No.	Unit Title	Credit	Level
Group A – Mandatory generic units				
Learners must achieve 29 credits from this group.				
1	D/601/6171	Knowledge of Health, Safety and Good Housekeeping in the Automotive Environment	3	2
2	K/601/6237	Knowledge of Materials, Fabrication, Tools and Measuring Devices used in the Automotive Environment	4	2
3	Y/601/6279	Skills in Materials, Fabrication, Tools and Measuring Devices used in the Automotive Environment	7	2
4	Y/601/7254	Skills in Health, Safety and Good Housekeeping in the Automotive Environment	7	2
5	J/601/6262	Skills in Supporting Job Roles in the Automotive Work Environment	5	3
6	T/601/6175	Knowledge of Support for Job Roles in the Automotive Work Environment	3	3
Group B – Mandatory specialist units				
Learners must achieve 44 credits from this group.				
7	H/602/6426	Knowledge of Routine Lift Truck Maintenance	2	2
8	R/602/6440	Skills in Routine Lift Truck Maintenance	2	2
9	F/602/6434	Knowledge of Lift Truck Mechanical Handling, Chassis Units and Components	6	2
10	K/602/6427	Knowledge of Lift Truck Power Plant, Lubrication and Cooling System Units and Components	3	2

Unit No.	Unit Reference No.	Unit Title	Credit	Level
Group B – Mandatory specialist units continued				
11	K/602/6430	Knowledge of Lift Truck Electrical Units and Components	6	2
12	M/602/6428	Knowledge of Lift Truck Fuel, Ignition, Air and Exhaust System Units and Components	3	2
13	R/602/6437	Knowledge of Inspecting Lift Trucks	3	2
14	D/602/6442	Skills in Removing and Replacing Lift Truck Electrical Units and Components	5	2
15	H/602/6443	Skills in Removing and Replacing Lift Truck Mechanical Handling, Chassis Units and Components	5	2
16	K/602/6444	Skills in Inspecting Lift Trucks Using Prescribed Methods	4	2
17	Y/602/6441	Skills in Removing and Replacing Lift Truck Power Plants Units and Components	5	2
Group C – Optional groups				
Learners must achieve a minimum of 10 credits from one of the Option Groups.				
Group C1 – Option group 1				
If this group is chosen, learners must achieve 10 credits from this group.				
18	M/601/6286	Skills to Identify and Agree Motor Vehicle Customer Service Needs	5	3
19	R/601/6247	Knowledge of how to Identify and Agree Motor Vehicle Customer Service Needs	5	3
Group C2 – Option group 2				
If this group is chosen, learners must achieve 11 credits from this group.				
20	J/602/6435	Knowledge of Lift Truck Driveline Units and Components	6	2
21	J/602/6449	Skills in Removing and Replacing Lift Truck Driveline Units and Components	5	2

What is the qualification structure for the Edexcel Level 2 Diploma in Lift Truck Maintenance and Repair Competence (QCF)?

A total of 103 credits are required to achieve this qualification. 29 credits from the mandatory generic units in Group A, 64 credits from mandatory specialist units in Group B and a minimum of 10 credits from one of the option groups in Group C.

Individual units can be found in the *Units* section.

Unit No.	Unit Reference No.	Unit Title	Credit	Level
Group A – Mandatory generic units				
Learners must achieve 29 credits from this group.				
1	D/601/6171	Knowledge of Health, Safety and Good Housekeeping in the Automotive Environment	3	2
2	K/601/6237	Knowledge of Materials, Fabrication, Tools and Measuring Devices used in the Automotive Environment	4	2
6	T/601/6175	Knowledge of Support for Job Roles in the Automotive Work Environment	3	3
22	A/601/6338	Competency in Health, Safety and Good Housekeeping in the Automotive Environment	7	2
23	K/601/6366	Competency in Supporting Job Roles in the Automotive Work Environment	5	3
3	Y/601/6279	Skills in Materials, Fabrication, Tools and Measuring Devices used in the Automotive Environment	7	2
Group B – Mandatory specialist units				
Learners must achieve 64 credits from this group.				
7	H/602/6426	Knowledge of Routine Lift Truck Maintenance	2	2
9	F/602/6434	Knowledge of Lift Truck Mechanical Handling, Chassis Units and Components	6	2
10	K/602/6427	Knowledge of Lift Truck Power Plant, Lubrication and Cooling System Units and Components	3	2

Unit No.	Unit Reference No.	Unit Title	Credit	Level
Group B – Mandatory specialist units continued				
11	K/602/6430	Knowledge of Lift Truck Electrical Units and Components	6	2
12	M/602/6428	Knowledge of Lift Truck Fuel, Ignition, Air and Exhaust System Units and Components	3	2
13	R/602/6437	Knowledge of Inspecting Lift Trucks	3	2
24	A/602/6416	Competency in Removing and Replacing Lift Truck Mechanical Handling, Chassis Units and Components	10	2
25	D/602/6411	Competency in Routine Lift Truck Maintenance	7	2
26	H/602/6412	Competency in Removing and Replacing Lift Truck Power Plants Units and Components	10	2
27	J/602/6418	Competency in Inspecting Lift Trucks Using Prescribed Methods	4	2
28	M/602/6414	Competency in Removing and Replacing Lift Truck Electrical Units and Components	10	2
Group C – Optional groups				
Learners must achieve a minimum of 10 credits from one of the Option Groups.				
Group C1 – Option group 1				
If this group is chosen, learners must achieve 10 credits from this group.				
19	R/601/6247	Knowledge of how to Identify and Agree Motor Vehicle Customer Service Needs	5	3
29	K/601/6383	Competency in Identifying and Agreeing Motor Vehicle Customer Service Needs	5	3
Group C2 – Option group 2				
If this group is chosen, learners must achieve 16 credits from this group.				
20	J/602/6435	Knowledge of Lift Truck Driveline Units and Components	6	2
30	L/602/6422	Competency in Removing and Replacing Lift Truck Driveline Units and Components	10	2

What is the qualification structure for the Edexcel BTEC Level 3 Diploma in Lift Truck Maintenance and Repair Principles (QCF)?

A minimum of 89 credits is required to achieve this qualification. 39 credits from the mandatory generic units in Group A, 40 credits from the mandatory specialist units in Group B and a minimum of 10 credits from one of the option groups in Group C.

Individual units can be found in the *Units* section.

Unit No.	Unit Reference No.	Unit Title	Credit	Level
Group A – Mandatory generic units				
Learners must achieve 39 credits from this group.				
1	D/601/6171	Knowledge of Health, Safety and Good Housekeeping in the Automotive Environment	3	2
2	K/601/6237	Knowledge of Materials, Fabrication, Tools and Measuring Devices used in the Automotive Environment	4	2
3	Y/601/6279	Skills in Materials, Fabrication, Tools and Measuring Devices used in the Automotive Environment	7	2
4	Y/601/7254	Skills in Health, Safety and Good Housekeeping in the Automotive Environment	7	2
5	J/601/6262	Skills in Supporting Job Roles in the Automotive Work Environment	5	3
6	T/601/6175	Knowledge of Support for Job Roles in the Automotive Work Environment	3	3
31	T/601/6242	Knowledge of how to Make Learning Possible through Demonstrations and Instruction	5	3
32	Y/601/6282	Skills in how to Make Learning Possible through Demonstrations and Instruction	5	3
Group B – Mandatory specialist units				
Learners must achieve 40 credits from this group.				
13	R/602/6437	Knowledge of Inspecting Lift Trucks	3	2
33	M/602/6431	Knowledge of Diagnosis and Rectification of Lift Truck Power Plant Engine Unit Faults	6	3

Unit No.	Unit Reference No.	Unit Title	Credit	Level
Group B – Mandatory specialist units continued				
34	Y/602/6424	Knowledge of Diagnosis and Rectification of Lift Truck Electrical Units and Component Faults	6	3
35	D/602/6439	Skills in Diagnosing and Rectifying Lift Truck Electrical Units and Component Faults	5	3
47	M/602/6445	Skills in Inspecting Lift Trucks to Comply with Legal Requirements	4	3
36	A/602/6447	Skills in Diagnosing and Rectifying Lift Truck Power Plant Engine Unit Faults	5	3
37	F/602/6448	Skills in Diagnosing and Rectifying Lift Truck Mechanical Handling and Chassis System Faults	5	3
38	T/602/6432	Knowledge of Diagnosis and Rectification of Lift Truck Mechanical Handling and Chassis System Faults	6	3
Group C – Optional groups				
Learners must achieve a minimum of 10 credits from one of the Option Groups.				
Group C1 – Option group 1				
If this group is chosen, learners must achieve 10 credits from this group.				
18	M/601/6286	Skills to Identify and Agree Motor Vehicle Customer Service Needs	5	3
19	R/601/6247	Knowledge of how to Identify and Agree Motor Vehicle Customer Service Needs	5	3
Group C2 – Option group 2				
If this group is chosen, learners must achieve 11 credits from this group.				
39	A/602/6450	Skills in Diagnosing and Rectifying Lift Truck Transmission and Driveline Faults	5	3
40	L/602/6436	Knowledge of Diagnosis and Rectification of Lift Truck Transmission and Driveline System Faults	6	3

What is the qualification structure for the Edexcel Level 3 Diploma in Lift Truck Maintenance and Repair Competence (QCF)?

A minimum of 104 credits is required to achieve this qualification. 39 credits from the mandatory generic units in Group A, 55 credits from the mandatory specialist units in Group B and a minimum of 10 credits from one of the option groups in Group C.

Individual units can be found in the *Units* section.

Unit No.	Unit Reference No.	Unit Title	Credit	Level
Group A – Mandatory generic units				
Learners must achieve 39 credits from this group.				
1	D/601/6171	Knowledge of Health, Safety and Good Housekeeping in the Automotive Environment	3	2
2	K/601/6237	Knowledge of Materials, Fabrication, Tools and Measuring Devices used in the Automotive Environment	4	2
3	Y/601/6279	Skills in Materials, Fabrication, Tools and Measuring Devices used in the Automotive Environment	7	2
6	T/601/6175	Knowledge of Support for Job Roles in the Automotive Work Environment	3	3
31	T/601/6242	Knowledge of how to Make Learning Possible through Demonstrations and Instruction	5	3
22	A/601/6338	Competency in Health, Safety and Good Housekeeping in the Automotive Environment	7	2
23	K/601/6366	Competency in Supporting Job Roles in the Automotive Work Environment	5	3
41	Y/601/6380	Competency in Making Learning Possible through Demonstrations and Instruction	5	3
Group B – Mandatory specialist units				
Learners must achieve 55 credits from this group.				
13	R/602/6437	Knowledge of Inspecting Lift Trucks	3	2
33	M/602/6431	Knowledge of Diagnosis and Rectification of Lift Truck Power Plant Engine Unit Faults	6	3

Unit No.	Unit Reference No.	Unit Title	Credit	Level
Group B – Mandatory specialist units continued				
34	Y/602/6424	Knowledge of Diagnosis and Rectification of Lift Truck Electrical Units and Component Faults	6	3
38	T/602/6432	Knowledge of Diagnosis and Rectification of Lift Truck Mechanical Handling and Chassis System Faults	6	3
42	F/602/6420	Competency in Diagnosing and Rectifying Lift Truck Power Plant Engine Unit Faults	10	3
43	J/602/6421	Competency in Diagnosing and Rectifying Lift Truck Mechanical Handling and Chassis System Faults	10	3
44	L/602/6419	Competency in Inspecting Lift Trucks to Comply with Legal Requirements	4	3
45	Y/602/6410	Competency in Diagnosing and Rectifying Lift Truck Electrical Units and Component Faults	10	3
Group C – Optional groups				
Learners must achieve a minimum of 10 credits from one of the Option Groups.				
Group C1 – Option group 1				
If this group is chosen, learners must achieve 10 credits from this group.				
19	R/601/6247	Knowledge of how to Identify and Agree Motor Vehicle Customer Service Needs	5	3
29	K/601/6383	Competency in Identifying and Agreeing Motor Vehicle Customer Service Needs	5	3
Group C2 – Option group 2				
If this group is chosen, learners must achieve 16 credits from this group.				
40	L/602/6436	Knowledge of Diagnosis and Rectification of Lift Truck Transmission and Driveline System Faults	6	3
46	R/602/6423	Competency in Diagnosing and Rectifying Lift Truck Transmission and Driveline Faults	10	3

How are the qualifications graded and assessed?

The overall grade for the qualifications is a 'pass'. The learner must achieve all the required units within the specified qualification structure.

To pass a unit the learner must:

- achieve **all** the specified learning outcomes
- satisfy **all** the assessment criteria by providing sufficient and valid evidence for each criterion
- show that the evidence is their own.

The qualifications are designed to be assessed:

- in the workplace or
- in conditions resembling the workplace, as specified in the assessment requirements/strategy for the sector, or
- as part of a training programme.

Assessment strategy for competence-based qualifications (VCQs)

The assessment strategy for the competence-based qualifications (VCQ) has been included in *Annexe C*. It has been developed by IMI in partnership with employers, training providers, awarding organisations and the regulatory authorities. The assessment strategy includes details on:

- criteria for defining realistic working environments
- roles and occupational competence of assessors, expert witnesses, internal verifiers and standards verifiers
- quality control of assessment
- evidence requirements.

Evidence of competence may come from:

- **current practice** where evidence is generated from a current job role
- a **programme of development** where evidence comes from assessment opportunities built into a learning/training programme whether at or away from the workplace
- the **Recognition of Prior Learning (RPL)** where a learner can demonstrate that they can meet the assessment criteria within a unit through knowledge, understanding or skills they already possess without undertaking a course of learning. They must submit sufficient, reliable and valid evidence for internal and standards verification purposes. RPL is acceptable for accrediting a unit, several units or a whole qualification
- a **combination** of these.

It is important that the evidence is:

Valid	relevant to the standards for which competence is claimed
Authentic	produced by the learner
Current	sufficiently recent to create confidence that the same skill, understanding or knowledge persist at the time of the claim
Reliable	indicates that the learner can consistently perform at this level
Sufficient	fully meets the requirements of the standards.

Types of evidence

To successfully achieve a unit the learner must gather evidence which shows that they have met the required standard in the assessment criteria. Evidence can take a variety of different forms including the examples below. Centres should refer to the assessment strategy for information about which of the following are permissible.

Centres should also refer to the assessment requirements/evidence requirements section within individual units for further guidance on assessment and evidence requirements.

- direct observation of the learner's performance by their assessor (O)
- outcomes from oral or written questioning (Q&A)
- products of the learner's work (P)
- personal statements and/or reflective accounts (RA)
- outcomes from simulation, where permitted by the assessment strategy (S)
- professional discussion (PD)
- assignment, project/case studies (A)
- authentic statements/witness testimony (WT)
- expert witness testimony (EWT)
- evidence of Recognition of Prior Learning (RPL).

The abbreviations may be used for cross-referencing purposes.

Learners can use one piece of evidence to prove their knowledge, skills and understanding across different assessment criteria and/or across different units. It is, therefore, not necessary for learners to have each assessment criterion assessed separately. Learners should be encouraged to reference the assessment criteria to which the evidence relates.

Evidence must be made available to the assessor, internal verifier and Edexcel standards verifier. A range of recording documents is available on the Edexcel website www.edexcel.com. Alternatively, centres may develop their own.

Centre recognition and approval

Centre recognition

Centres that have not previously offered Edexcel qualifications need to apply for and be granted centre recognition as part of the process for approval to offer individual qualifications. New centres must complete both a centre recognition approval application and a qualification approval application.

Existing centres will be given 'automatic approval' for a new qualification if they are already approved for a qualification that is being replaced by the new qualification and the conditions for automatic approval are met. Centres already holding Edexcel approval are able to gain qualification approval for a different level or different sector via Edexcel online.

Approvals agreement

All centres are required to enter into an approvals agreement which is a formal commitment by the head or principal of a centre to meet all the requirements of the specification and any linked codes or regulations. Edexcel will act to protect the integrity of the awarding of qualifications, if centres do not comply with the agreement. This could result in the suspension of certification or withdrawal of approval.

Quality assurance

Quality assurance is at the heart of vocational qualifications. Assessment on BTEC and Competency qualifications is completed by your centre. You use quality assurance to ensure that your managers, internal verifiers and assessors are standardised and supported. We use quality assurance to check that all centres are working to national standards. It gives us the opportunity to identify and provide support where it is needed in order to safeguard certification. It also allows us to recognise and support good practice.

For the qualifications in this specification, the Edexcel quality assurance model will follow one of the three processes listed below.

1. Delivery of the **Competence and Principles** qualifications as part of a BTEC apprenticeship (single click registration)
 - integrated annual visits by a Standards Verifier to review centre-wide quality assurance systems and sampling of internal verification and assessor decisions

2. Delivery of the **Competence** qualifications outside the apprenticeship
 - annual visits to centres by a Centre Quality Reviewer to review centre-wide quality assurance systems
 - annual visits by a Standards Verifier for sampling of internal verification and assessor decisions for the qualification
3. Delivery of the **Principles** qualifications outside the apprenticeship
 - annual visits to centres by a Centre Quality Reviewer to review centre-wide quality assurance systems
 - Lead Internal Verifier accreditation. This involves online training and standardisation of Lead Internal Verifiers using our OSCA platform, accessed via Edexcel Online. Please note that not all qualifications are covered by Lead Internal Verifier accreditation. Where this is the case we will allocate a Standards Verifier annually to conduct postal sampling of internal verification and assessor decisions for the Principal Subject Area.

For further details, go to the UK BTEC Quality Assurance Handbook 2011-12
<http://www.edexcel.com/quals/BTEC/quality/Pages/documents.aspx>

What resources are required?

Each qualification is designed to support learners working in the automotive sector. Physical resources need to support the delivery of the qualifications and the assessment of the learning outcomes and must be of industry standard.

For competence based qualifications (VCQs), centres must meet any specific resource and staff requirements outlined in *Annexe C: Assessment strategy*.

Unit format

Each unit in this specification contains the following sections.

Unit title:					The unit title is approved on the QCF and this form of words will appear on the learner's Notification of Performance (NOP).
Unit reference number:					This code is a unique reference number for the unit.
QCF Level:					All units and qualifications within the QCF have a level assigned to them, which represents the level of achievement. There are nine levels of achievement, from Entry level to level 8. The level of the unit has been informed by the QCF level descriptors and, where appropriate, the NOS and/or other sector/professional.
Credit value:					All units have a credit value. The minimum credit value is one, and credits can only be awarded in whole numbers. Learners will be awarded credits when they achieve the unit.
Guided learning hours:					A notional measure of the substance of a qualification. It includes an estimate of the time that might be allocated to direct teaching or instruction, together with other structured learning time, such as directed assignments, assessments on the job or supported individual study and practice. It excludes learner-initiated private study.
Unit summary:					This provides a summary of the purpose of the unit.
Assessment requirements/evidence requirements:					The assessment/evidence requirements are determined by the SSC. Learners must provide evidence for each of the requirements stated in this section.
Learning outcomes:	Assessment criteria:	Evidence type:	Portfolio reference:	Date:	
			The learner should use this box to indicate where the evidence can be obtained eg portfolio page number.	The learner should give the date when the evidence has been provided.	
Learning outcomes state exactly what a learner should know, understand or be able to do as a result of completing a unit.		The assessment criteria of a unit specify the standard a learner is expected to meet to demonstrate that a learning outcome, or a set of learning outcomes, has been achieved.		Learners must reference the type of evidence they have and where it is available for quality assurance purposes. The learner can enter the relevant key and a reference. Alternatively, the learner and/or centre can devise their own referencing system.	

Units

Unit 1: Knowledge of Health, Safety and Good Housekeeping in the Automotive Environment

Unit reference number: D/601/6171

QCF Level: 2

Credit value: 3

Guided learning hours: 30

Unit summary

This unit enables the learner to develop an understanding of:

- routine maintenance and cleaning of the automotive environment and using resources economically
- 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.

Assessment requirements/Evidence requirements:

If this unit is offered within a competence qualification (VCQ) it must be assessed in accordance with the IMI Assessment Strategy (*Annexe C*).

This unit must adhere to the IMI Knowledge Unit Syllabus as set out below:

Economic use of Resources

- a. consumable materials eg 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

Routine maintenance of the workplace

- a. trainees 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 manufacturers' recommendations
- m. location of routine maintenance information eg 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

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

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 vehicles, 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 eg hazardous substances
- i. the correct selection and use of extraction equipment

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 vehicles
 - 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

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. vehicle 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 vehicles

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

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 ie 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 ie 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

Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
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			

Learning outcomes		Assessment criteria			Evidence type	Portfolio reference	Date
3	Understand key health and safety requirements relevant to the automotive environment	3.1	list the main legislation relating to automotive environment health and safety				
		3.2	describe the general legal duties of employers and employees required by current health and safety legislation				
		3.3	describe key, current health and safety requirements relating to the automotive environment				
		3.4	describe why workplace policies and procedures relating to health and safety are important				
4	Understand about hazards and potential risks relevant to the automotive environment	4.1	identify key hazards and risks in an automotive environment				
		4.2	describe policies and procedures for reporting hazards, risks, health and safety matters in the automotive environment				
		4.3	state precautions and procedures which need to be taken when working with vehicles, associated materials, tools and equipment				
		4.4	identify fire extinguishers in common use and which types of fire they should be used on				
		4.5	identify key warning signs and their characteristics that are found in the vehicle repair environment				
		4.6	state the meaning of common product warning labels used in an automotive environment				

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
5	Understand personal responsibilities	5.1	explain the importance of personal conduct in maintaining the health and safety of the individual and others			
		5.2	explain the importance of personal presentation in maintaining health safety and welfare			

Learner name: _____ Date: _____

Learner signature: _____ Date: _____

Assessor signature: _____ Date: _____

Internal verifier signature: _____ Date: _____
(if sampled)

Unit 2: Knowledge of Materials, Fabrication, Tools and Measuring Devices used in the Automotive Environment

Unit reference number: K/601/6237

QCF Level: 2

Credit value: 4

Guided learning hours: 40

Unit Summary

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
- the correct application of automotive engineering fabrication and fitting principles.

Assessment Requirements/Evidence requirements:

If this unit is offered within a competence qualification (VCQ) it must be assessed in accordance with the IMI Assessment Strategy (*Annexe C*).

This unit must adhere to the IMI Knowledge Unit Syllabus as set out below:

Common types of hand tools used for fabricating and fitting in the automotive workplace. To include:

- a. files
- b. hacksaws and snips
- c. hammers
- d. screwdrivers
- e. pliers
- f. spanners
- g. sockets
- h. punches
- i. types of drill and drill bits

- j. taps and dies
- k. stud removers
- l. marking out tools

Common measuring devices used for fabrication and fitting in the automotive workplace. To include:

- a. rule/tape
- b. callipers
- c. feeler gauge
- d. volume measures
- e. micrometer
- f. dial gauges
- g. torque wrenches
- h. depth gauges

Common electrical measuring tools used in the repair of vehicles and components. To include:

- a. ammeter
- b. voltmeter
- c. ohmmeter
- d. multi-meter

Common electrical terms when measuring:

- a. voltage
- b. current
- c. resistance

Workshop equipment (including appropriate PPE). To include:

- a. hydraulic jacks
- b. axle stands
- c. pillar drills
- d. air tools
- e. vehicle lifts
- f. cranes
- g. hoists
- h. electrical power tools

Properties, application and limitations (to include safe use) of ferrous and non-ferrous metals used when constructing, modifying and repairing vehicles and components. Materials to include:

- a. carbon steels
- b. alloy steels
- c. cast iron
- d. aluminium alloys
- e. brass
- f. copper
- g. lead

Properties, application and limitations (to include safe use) of non-metallic materials used when constructing, modifying and repairing vehicles and components. Materials to include:

- a. glass
- b. plastics (inc. GRP)
- c. Kevlar
- d. rubber

Terms relating to the properties of materials. To include:

- a. hardness
- b. toughness
- c. ductility
- d. elasticity
- e. tenacity
- f. malleability
- g. plasticity

Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria			Evidence type	Portfolio reference	Date
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				

Learning outcomes		Assessment criteria			Evidence type	Portfolio reference	Date
3	Understand how to select materials when fabricating, modifying and repairing vehicles and fitting components	3.1	describe the properties, application and limitations of ferrous and non-ferrous metals, including their safe use				
		3.2	describe the properties, application and limitations of common non-metallic materials, including their safe use				
		3.3	define common terms relating to the properties of materials				
4	Understand how to apply automotive engineering, fabrication and fitting principles when modifying and repairing vehicles and components	4.1	describe how to tap threads, file, cut and drill plastics and metals when modifying or repairing vehicles				
		4.2	describe how to measure, mark out, shape and join materials when fabricating				
		4.3	describe the selection and fitting procedures of the following: a. gaskets and seals b. sealants and adhesives c. fittings and fasteners d. electrical circuit components				
		4.4	identify locking, fastening and fixing devices				
		4.5	state the importance of correct operating specifications for limits, fits and tolerances in the automotive environment				

Learner name: _____
Learner signature: _____
Assessor signature: _____
Internal verifier signature: _____
(if sampled)

Date: _____
Date: _____
Date: _____
Date: _____

Unit 3: Skills in Materials, Fabrication, Tools and Measuring Devices used in the Automotive Environment

Unit reference number: Y/601/6279

QCF Level: 2

Credit value: 7

Guided learning hours: 60

Unit Summary

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
- the correct application of automotive engineering fabrication and fitting principles.

Assessment Requirements/Evidence requirements:

If this unit is offered within a competence qualification (VCQ) it must be assessed in accordance with the IMI Assessment Strategy (*Annexe C*).

This unit must adhere to the IMI Skills Unit Assessment Requirements developed for the unit as detailed below:

You must:

1. produce evidence to show you meet **all** of the Learning Outcomes
2. produce performance evidence resulting from work you have carried out in your training workshop as managed and organised by an approved centre
3. be observed by an assessor as defined by the IMI Assessment Strategy

4. 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
5. 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
5. be observed by your assessor carrying out routine checks and during stages of fabrication.

Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
1	Be able to select, maintain and use and 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			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
4	Be able to apply automotive engineering, fabrication and fitting principles when modifying and repairing vehicles and components	4.1	use correct procedures when: 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: 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			

Learner name: _____ Date: _____
Learner signature: _____ Date: _____
Assessor signature: _____ Date: _____
Internal verifier signature: _____ Date: _____
(if sampled)

Unit 4: Skills in Health, Safety and Good Housekeeping in the Automotive Environment

Unit reference number: Y/601/7254

QCF Level: 2

Credit value: 7

Guided learning hours: 60

Unit Summary

This unit will enable the learner to develop the skills required 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
- work safely at all times within the automotive environment, both as an individual and with others.

Assessment Requirements/Evidence requirements:

This unit must adhere to the IMI Skills Unit Assessment Requirements as set out below:

You must:

1. produce evidence to show you meet **all** of the Learning Outcomes
2. produce performance evidence resulting from work you have carried out in your training workshop as managed and organised by an approved centre
3. be observed by an assessor as defined by the IMI Assessment Strategy
4. produce evidence of use of personal and vehicle protection, cleaning the work environment and disposal of waste on **2** separate **occasions**

5. produce evidence of identifying risks which may result from at least **2** of the items listed below:
 - 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
6. produce evidence of identifying risks
7. produce evidence of following at least **2** of the workplace policies listed below:
 - 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
8. produce evidence of following at least **2** of the workplace policies listed below:
 - 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
9. produce evidence of following workplace policies

Learning outcomes and assessment criteria

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
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: 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 minimizes inconvenience to customers and staff			

Learning outcomes		Assessment criteria			Evidence type	Portfolio reference	Date
3	Be able to recognise and deal with dangers in order to work safely within the automotive workplace	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				
		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				

Learner name: _____
Learner signature: _____
Assessor signature: _____
Internal verifier signature: _____
(if sampled)

Date: _____
Date: _____
Date: _____
Date: _____

Unit 5: Skills in Supporting Job Roles in the Automotive Work Environment

Unit reference number: J/601/6262

QCF Level: 3

Credit value: 5

Guided learning hours: 40

Unit summary

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

Assessment Requirements/Evidence requirements:

This unit must adhere to the IMI Skills Unit Assessment Requirements as set out below:

You must:

1. produce evidence to show you meet **all** of the Learning Outcomes
2. produce performance evidence resulting from work you have carried out in your training workshop as managed and organised by an approved centre
3. be observed by an assessor as defined by the IMI Assessment Strategy
4. produce witness testimony from your peers **and** supervisor **or** tutor that you have worked well with others
5. produce evidence carrying out the above whilst performing your normal duties

Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
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 technical 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			
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			

Learner name: _____
Learner signature: _____
Assessor signature: _____
Internal verifier signature: _____
(if sampled)

Date: _____
Date: _____
Date: _____
Date: _____

Unit 6: Knowledge of Support for Job Roles in the Automotive Work Environment

Unit reference number: T/601/6175

QCF Level: 3

Credit value: 3

Guided learning hours: 20

Unit summary

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.

Assessment Requirements/Evidence requirements:

If this unit is offered within a competence qualification (VCQ) it must be assessed in accordance with the IMI Assessment Strategy (*Annexe C*).

This unit must adhere to the IMI Knowledge Unit Syllabus as set out below:

The structure of a typical vehicle repair business

- a. how these areas relate to each other within the business:
 - i. body shop
 - ii. vehicle repair workshop
 - iii. paint shop
 - iv. valeting
 - v. vehicle parts store
 - vi. main office
 - vii. vehicle sales
 - viii. reception
- 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 vehicle repairs

- a. locating and using correct documentation and information for:
 - i. recording vehicle maintenance and repairs
 - ii. vehicle 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

Methods of Communication

- a. verbal
- b. signs and notices
- c. memos
- d. telephone
- e. electronic mail
- f. vehicle job card
- g. notice boards
- h. sms text messaging
- i. letters

organisational and customer requirements:

- a. importance of time scales to customer and organization
- 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

Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
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: 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			

Learning outcomes		Assessment criteria			Evidence type	Portfolio reference	Date
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				

Learner name: _____
Learner signature: _____
Assessor signature: _____
Internal verifier signature: _____
(if sampled)

Date: _____
Date: _____
Date: _____
Date: _____

Unit 7: Knowledge of Routine Lift Truck Maintenance

Unit reference number: H/602/6426

QCF Level: 2

Credit value: 2

Guided learning hours: 20

Unit Summary

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.

Assessment Requirements/Evidence requirements:

If this unit is offered within a competence qualification (VCQ) it must be assessed in accordance with the IMI Assessment Strategy (*Annexe C*).

This unit must adhere to the IMI Knowledge Unit Syllabus as set out below:

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

- e. types of bearing to include:
 - i. roller
 - ii. taper roller
 - iii. needle
 - iv. 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
 - iii. brake fade
 - iv. brake balance

- k. layout and operation of lift truck suspension systems, layout and components of suspension systems including:
 - i. non-independent
 - ii. swinging axle
- l. 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 belts 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
- 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
 - ii. plates
 - iii. separators
 - iv. electrolyte
 - v. charging and discharging
- 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
 - x. demisting systems
 - 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

- 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 and catalytic converters
- 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(λ 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
- 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
 - 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. carburetors
 - 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
 - xiii. ignition timing advance
- 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

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 website

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

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

Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
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			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
	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				

Learner name: _____ Date: _____
Learner signature: _____ Date: _____
Assessor signature: _____ Date: _____
Internal verifier signature: _____ Date: _____
(if sampled)

Unit 8: Skills in Routine Lift Truck Maintenance

Unit reference number: R/602/6440

QCF Level: 2

Credit value: 2

Guided learning hours: 20

Unit summary

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.

Assessment Requirements/Evidence requirements:

This unit must adhere to the IMI Skills Unit Assessment Requirements as set out below:

You must:

1. produce evidence to show you meet **all** of the Learning Outcomes
2. produce performance evidence resulting from work you have carried out in your training workshop as managed and organised by an approved centre
3. be observed by an assessor as defined by the IMI Assessment Strategy
4. be observed by an assessor carrying out servicing activities on **at least 1 lift truck**

Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
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			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
4	Be able to carry out lift truck routine maintenance	4.1	<p>carry out lift truck inspections using prescribed methods, adhering to the correct specifications and tolerances for the vehicle and following:</p> <ul style="list-style-type: none"> a. the manufacturer's approved inspection methods b. Recognised researched inspection methods c. health and safety requirements 			
		4.2	<p>carry out adjustments, replacement of components and replenishment of consumable materials following the manufacturer's current specification for:</p> <ul style="list-style-type: none"> a. the particular maintenance interval b. working methods and procedures c. use of equipment d. the tolerances relevant to the lift truck 			
		4.3	<p>ensure the examination methods identify accurately any lift truck system and or component problems falling outside the maintenance schedule are specified</p>			
		4.4	<p>ensure that inspected lift truck conforms to the operating specification and any legal requirements</p>			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
5	Be able to record information and make suitable recommendations	4.5	ensure any comparison of the lift truck systems against specification accurately identifies any differences from the specification and faults			
		4.6	use suitable testing methods to evaluate the performance of all replaced and adjusted components and systems accurately			
		5.1	produce work records that are accurate, complete and passed to the relevant person(s) promptly in the format required			
		5.2	make suitable and justifiable recommendations for cost effective repairs			
		5.3	record and report any additional faults noticed during the course of their work promptly in the format required			

Learner name: _____ Date: _____

Learner signature: _____ Date: _____

Assessor signature: _____ Date: _____

Internal verifier signature: _____ Date: _____
(if sampled)

Unit 9: Knowledge of Lift Truck Mechanical Handling, Chassis Units and Components

Unit reference number: F/602/6434

QCF Level: 2

Credit value: 6

Guided learning hours: 45

Unit summary

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.

Assessment Requirements/Evidence requirements:

If this unit is offered within a competence qualification (VCQ) it must be assessed in accordance with the IMI Assessment Strategy (*Annexe C*).

This unit must adhere to the IMI Knowledge Unit Syllabus as set out below:

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

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 suspension systems:
 - i. non-independent suspensions
 - ii. swinging axle

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 belts 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
 - i. hydraulics
 - ii. pumps
 - iii. valve blocks
 - iv. circuits

- v. circuit diagrams
- vi. pressures and flows
- vii. filters
- viii. rams – displacement and vented
- ix. control systems
- x. faults
- xi. overload and safety precautions
- xii. mechanical
- xiii. mast types – duplex, triplex, full free, reach, boom/telescopic
- xiv. mast design
- xv. lift chain design
- xvi. fork design
- xvii. roll over protection systems (ROPS) – legal requirements
- xviii. falling object protection systems (FOPS) – legal requirements
- xix. 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
 - iv. electrical testing equipment (multi-meters)
 - v. pressure gauges

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
 - 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 important 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

- f. the reasons why replacement components and units must meet the original specifications (OES):
 - i. warranty requirements
 - ii. to maintain performance
 - iii. safety requirement
- 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

Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
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			

Learning outcomes	Assessment criteria		Evidence type	Portfolio reference	Date
	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			
3 Understand how lift truck braking systems operate	3.1	identify lift truck braking system components			
	3.2	describe the construction and operation of lift truck braking system units and components			
	3.3	compare key lift truck braking system components and assemblies against alternatives to identify differences in construction and operation			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
		3.4	<p>identify the key engineering principles that are related to lift truck braking systems</p> <p>a. laws of friction</p> <p>b. hydraulic machines</p> <p>c. properties of fluids</p> <p>d. braking efficiency</p>			
		3.5	state common terms used in lift truck braking system design			
4	Understand how to check, replace and test lift truck mast and carriage, hydraulics, steering and braking systems units components	4.1	describe how to remove and replace lift truck mast and carriage, hydraulics, steering and braking system components			
		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			
		4.3	describe how to evaluate the performance of replacement units against lift truck specification			
		4.4	describe common faults found in lift truck mast and carriage, hydraulics, steering and braking systems and their causes			

Learner name: _____ Date: _____
Learner signature: _____ Date: _____
Assessor signature: _____ Date: _____
Internal verifier signature: _____ Date: _____
(if sampled)

Unit 10: Knowledge of Lift Truck Power Plant, Lubrication and Cooling System Units and Components

Unit reference number: K/602/6427

QCF Level: 2

Credit value: 3

Guided learning hours: 20

Unit Summary

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.

Assessment Requirements/Evidence requirements:

If this unit is offered within a competence qualification (VCQ) it must be assessed in accordance with the IMI Assessment Strategy (*Annexe C*).

This unit must adhere to the IMI Knowledge Unit Syllabus as set out below:

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 and catalytic converters

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

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

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

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

Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria			Evidence type	Portfolio reference	Date
1	Understand how the main lift truck power plant systems operate	1.1	identify lift truck power plant system components including diesel engine, gas engine and electric				
		1.2	describe the construction and operation of lift truck power plant systems				
		1.3	compare key lift truck engine power plant 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 power plant systems <ul style="list-style-type: none"> a. compression ratio's b. volumetric efficiency c. cylinder capacity d. electric motor principles 				
		1.5	state common terms used in lift truck power plant system design				
2	Understand how lift truck engine Lubrication systems operate	2.1	identify lift truck engine lubrication system components				
		2.2	describe the construction and operation of lift truck engine lubrication components and systems				
		2.3	compare key lift truck lubrication system components and assemblies to identify differences in construction and operation				

Learning outcomes		Assessment criteria			Evidence type	Portfolio reference	Date
3	Understand how lift truck cooling systems operate	2.4	<p>identify the key engineering principles that are related to lift truck engine lubrication systems</p> <p>a. classification of lubricants</p> <p>b. properties of lubricants</p> <p>c. methods of reducing friction</p>				
		2.5	state common terms used in lift truck engine lubrication system design				
		3.1	identify lift truck engine cooling system components				
		3.2	describe the construction and operation of lift truck engine cooling systems				
		3.3	compare key lift truck engine cooling system components and assemblies against alternatives to identify differences in construction and operation				
		3.4	<p>identify the key engineering principles that are related to lift truck engine cooling systems</p> <p>a. heat transfer</p> <p>b. linear and cubical expansion</p> <p>c. specific heat capacity</p> <p>d. boiling point of liquids</p>				
		3.5	state common terms used in key lift truck engine cooling system design				

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
4	Understand how to check, replace and test power plant, lubrication and cooling system units and components	4.1	describe how to remove and replace power plant, lubrication and cooling system units and components			
		4.2	describe common types of testing methods used to check the operation of power plant, lubrication and cooling system units and components and their purpose			
		4.3	describe how to evaluate the performance of replacement units against lift truck specification			
		4.4	describe common faults found in lift truck power plant, lubrication and cooling systems and their causes			

Learner name: _____ Date: _____

Learner signature: _____ Date: _____

Assessor signature: _____ Date: _____

Internal verifier signature: _____ Date: _____
(if sampled)

Unit 11: Knowledge of Lift Truck Electrical Units and Components

Unit reference number: K/602/6430

QCF Level: 2

Credit value: 6

Guided learning hours: 45

Unit Summary

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.

Assessment Requirements/Evidence requirements:

If this unit is offered within a competence qualification (VCQ) it must be assessed in accordance with the IMI Assessment Strategy (*Annexe C*).

This unit must adhere to the IMI Knowledge Unit Syllabus as set out below:

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
- 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
- b. function and construction of electrical components including:
 - i. front and tail lamps
 - ii. work lamps
 - iii. lighting switch
 - iv. anti theft devices
 - vi. manual locking systems
 - v. demisting 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
 - vi. demisting systems
- 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
 - iv. prevention of electric shock
 - v. protection of electrical and electronic components
 - vi. 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)

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

Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria			Evidence type	Portfolio reference	Date
1	Understand lift truck electrical and electronic principles	1.1	identify electrical symbols and units found in lift truck circuits				
		1.2	describe how to interpret simple lift truck wiring diagrams				
		1.3	describe the operation of key lift truck circuit protection devices and why these are necessary				
		1.4	describe lift truck earthing principles and earthing methods				
		1.5	identify the use of different cables and connectors used in lift truck circuits				
		1.6	describe the operation of electrical and electronic sensors, actuators and their application				
		1.7	describe common types of testing methods used to check the operation of electrical and electronic circuits and their purpose				
		1.8	describe the key electrical/electronic control principles that are related to lift truck electrical circuits				
		1.9	state common terms used in lift truck electrical circuits				

Learning outcomes		Assessment criteria			Evidence type	Portfolio reference	Date
2	Understand how lift truck batteries, starting and charging systems operate	2.1	Identify lift truck batteries, starting and charging system components				
		2.2	describe the construction and operation of lift truck batteries, starting and charging system components				
		2.3	compare batteries, starting and charging system components and assemblies against alternatives to identify differences in construction and operation				
		2.4	state common terms used in conjunction with lift truck batteries, starting and charging systems				
3	Understand how lift truck auxiliary electrical systems operate	3.1	identify lift truck auxiliary system components				
		3.2	describe the construction and operation of lift truck auxiliary systems				
		3.3	compare key auxiliary system components and assemblies against alternatives to identify differences in construction and operation				
		3.4	state common terms used in lift truck auxiliary system design				

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
4	Understand how to check, replace and test lift truck batteries, starter, charging and auxiliary electrical units components and systems	4.1	describe how to remove and replace lift truck batteries, starter, charging and auxiliary electrical system units and components			
		4.2	describe common types of testing methods used to check the operation of batteries, starter, charging and auxiliary electrical systems and their purpose			
		4.3	describe how to evaluate the performance of replacement units against lift truck specification			
		4.4	describe common faults found in lift truck batteries, starter, charging and auxiliary electrical systems and their causes			

Learner name: _____ Date: _____

Learner signature: _____ Date: _____

Assessor signature: _____ Date: _____

Internal verifier signature: _____ Date: _____
(if sampled)

Unit 12: Knowledge of Lift Truck Fuel, Ignition, Air and Exhaust System Units and Components

Unit reference number: M/602/6428

QCF Level: 2

Credit value: 3

Guided learning hours: 20

Unit Summary

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.

Assessment Requirements/Evidence requirements:

If this unit is offered within a competence qualification (VCQ) it must be assessed in accordance with the IMI Assessment Strategy (*Annexe C*).

This unit must adhere to the IMI Knowledge Unit Syllabus as set out below:

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

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
- 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

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

Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria			Evidence type	Portfolio reference	Date
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 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				

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
3	Understand how lift truck air supply and exhaust systems operate	2.4	<p>identify the key engineering principles that are related to lift truck ignition systems</p> <p>a. flame travel</p> <p>b. ignition timing</p>			
		2.5	state common terms used in key lift truck ignition system design			
		3.1	identify lift truck air supply and exhaust system components			
		3.2	describe the construction and operation of lift truck air supply and exhaust systems			
		3.3	compare key lift truck air supply and exhaust system components and assemblies against alternatives to identify differences in construction and operation			
		3.4	<p>identify the key engineering principles that are related to lift truck air supply and exhaust systems</p> <p>a. sound absorption</p> <p>b. reduction of harmful emissions</p>			
		3.5	state common terms used in lift truck air supply and exhaust system design			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
4	Understand how to check, replace and test lift truck fuel, ignition, air and exhaust system units and components	4.1	describe how to remove and replace lift truck fuel, ignition, air supply and exhaust system units and components			
		4.2	describe common types of testing methods used to check the operation of engine fuel, air supply and exhaust systems and their purpose			
		4.3	describe how to evaluate the performance of replacement units against lift truck specification			
		4.4	describe common faults found in lift truck fuel, air supply and exhaust systems and their causes			

Learner name: _____ Date: _____
Learner signature: _____ Date: _____
Assessor signature: _____ Date: _____
Internal verifier signature: _____ Date: _____
(if sampled)

Unit 13: Knowledge of Inspecting Lift Trucks

Unit reference number: R/602/6437

QCF Level: 2

Credit value: 3

Guided learning hours: 20

Unit Summary

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.

Assessment Requirements/Evidence requirements:

If this unit is offered within a competence qualification (VCQ) it must be assessed in accordance with the IMI Assessment Strategy (*Annexe C*).

This unit must adhere to the IMI Knowledge Unit Syllabus as set out below:

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
- 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

Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria			Evidence type	Portfolio reference	Date
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				

Learner name: _____
Learner signature: _____
Assessor signature: _____
Internal verifier signature: _____
(if sampled)

Date: _____
Date: _____
Date: _____
Date: _____

Unit 14: Skills in Removing and Replacing Lift Truck Electrical Units and Components

Unit reference number: D/602/6442

QCF Level: 2

Credit value: 5

Guided learning hours: 45

Unit Summary

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.

Assessment Requirements/Evidence requirements:

This unit must adhere to the IMI Skills Unit Assessment Requirements as set out below:

You must:

1. produce evidence to show you meet **all** of the Learning Outcomes
2. produce performance evidence resulting from work you have carried out in your training workshop as managed and organised by an approved centre
3. be observed by an assessor as defined by the IMI Assessment Strategy
4. be observed by an assessor removing and replacing **at least 4** units or components, **each** from a **different** electrical system listed below:
 - lighting system
 - wiper system
 - accelerator system
 - electric warning system
 - direction control system
 - hydraulic auxiliary system
 - speed governing system
 - starting system
 - charging system
 - traction control system
 - electric drive, hydraulic and steering motors
 - monitoring and instrumentation system

Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
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: 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			

Learning outcomes		Assessment criteria			Evidence type	Portfolio reference	Date
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: 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				
5	Be able to record information and make suitable recommendations	5.1	produce work records that are accurate, complete and passed to the relevant person(s) promptly in the format required				
		5.2	make suitable and justifiable recommendations for cost effective repairs				
		5.3	record and report any additional faults noticed during the course of their work promptly in the format required				

Learner name: _____
Learner signature: _____
Assessor signature: _____
Internal verifier signature: _____
(if sampled)

Date: _____
Date: _____
Date: _____
Date: _____

Unit 15: Skills in Removing and Replacing Lift Truck Mechanical Handling, Chassis Units and Components

Unit reference number: H/602/6443

QCF Level: 2

Credit value: 5

Guided learning hours: 45

Unit Summary

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.

Assessment Requirements/Evidence requirements:

This unit must adhere to the IMI Skills Unit Assessment Requirements as set out below:

You must:

1. produce evidence to show you meet **all** of the Learning Outcomes
2. produce performance evidence resulting from work you have carried out in your training workshop as managed and organised by an approved centre
3. be observed by an assessor as defined by the IMI Assessment Strategy
4. be observed by an assessor removing and replacing **3 different units or components** which **must include items from:**
 - mechanical handling system
 - hydraulic system
 - steering system
 - braking systems

Your evidence must include demonstration of competence **in each** aspect of mechanical, electrical and hydraulic/fluid units or component removal and replacement.

Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
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: 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			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
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: 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			
5	Be able to record information and make suitable recommendations	5.1	produce work records that are accurate, complete and passed to the relevant person(s) promptly in the format required			
		5.2	make suitable and justifiable recommendations for cost effective repairs			
		5.3	record and report any additional faults noticed during the course of their work promptly in the format required			

Learner name: _____
Learner signature: _____
Assessor signature: _____
Internal verifier signature: _____
(if sampled)

Date: _____
Date: _____
Date: _____
Date: _____

Unit 16: Skills in Inspecting Lift Trucks Using Prescribed Methods

Unit reference number: K/602/6444

QCF Level: 2

Credit value: 4

Guided learning hours: 30

Unit Summary

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.

Assessment Requirements/Evidence requirements:

This unit must adhere to the IMI Skills Unit Assessment Requirements as set out below:

You must:

1. produce evidence to show you meet **all** of the Learning Outcomes
2. produce performance evidence resulting from work you have carried out in your training workshop as managed and organised by an approved centre
3. be observed by an assessor as defined by the IMI Assessment Strategy
4. be observed by an assessor carrying out **2 different** inspections from the following:
 - pre-work inspections
 - post-work inspections

Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
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			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
4	Be able to carry out lift truck inspections using prescribed methods	4.1	<p>carry out lift truck inspections using prescribed methods, adhering to the correct specifications and tolerance and following:</p> <ul style="list-style-type: none"> 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	<p>ensure any comparison of the lift truck against specification accurately identifies any:</p> <ul style="list-style-type: none"> 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			
5	Be able to record information and make suitable recommendations	5.1	produce work records that are accurate, complete and passed to the relevant person(s) promptly in the format required			
		5.2	make suitable and justifiable recommendations for future action based upon the inspection			
		5.3	record and report any additional faults noticed during the course of their work promptly in the format required			

Learner name: _____
Learner signature: _____
Assessor signature: _____
Internal verifier signature: _____
(if sampled)

Date: _____
Date: _____
Date: _____
Date: _____

Unit 17: Skills in Removing and Replacing Lift Truck Power Plants Units and Components

Unit reference number: Y/602/6441

QCF Level: 2

Credit value: 5

Guided learning hours: 45

Unit Summary

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.

Assessment Requirements/Evidence requirements:

This unit must adhere to the IMI Skills Unit Assessment Requirements as set out below:

You must:

1. produce evidence to show you meet **all** of the Learning Outcomes
2. produce performance evidence resulting from work you have carried out in your training workshop as managed and organised by an approved centre
3. be observed by an assessor as defined by the IMI Assessment Strategy
4. be observed by an assessor removing and replacing **at least 1** unit or component **from** at least **3** of the **6** systems listed below:
 - engine mechanical system
 - cooling system
 - air supply and exhaust system
 - fuel and ignition systems
 - engine electrical systems
 - lubrication system

Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
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: <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 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			

Learning outcomes		Assessment criteria			Evidence type	Portfolio reference	Date
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				
5	Be able to record information and make suitable recommendations	5.1	produce work records that are accurate, complete and passed to the relevant person(s) promptly in the format required				
		5.2	make suitable and justifiable recommendations for cost effective repairs				
		5.3	record and report any additional faults noticed during the course of their work promptly in the format required				

Learner name: _____
Learner signature: _____
Assessor signature: _____
Internal verifier signature: _____
(if sampled)

Date: _____
Date: _____
Date: _____
Date: _____

Unit 18: Skills to Identify and Agree Motor Vehicle Customer Service Needs

Unit reference number: M/601/6286

QCF Level: 3

Credit value: 5

Guided learning hours: 40

Unit Summary

This unit helps the learner to develop the skills required 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.

Assessment Requirements/Evidence requirements:

This unit must adhere to the IMI Skills Unit Assessment Requirements as set out below:

You must:

1. produce evidence to show you meet all of the Learning Outcomes
2. produce performance evidence resulting from work you have carried out in your training workshop as managed and organised by an approved centre
3. be observed by an assessor as defined by the IMI Assessment Strategy
4. produce evidence, including records, to show that you have dealt with 3 different customers
5. be observed by your assessor on at least 1 occasion.

Evidence from real activity **or role-play is acceptable** for this unit

Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
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			

Learner name: _____
Learner signature: _____
Assessor signature: _____
Internal verifier signature: _____
(if sampled)

Date: _____
Date: _____
Date: _____
Date: _____

Unit 19: Knowledge of how to Identify and Agree Motor Vehicle Customer Service Needs

Unit reference number: R/601/6247

QCF Level: 3

Credit value: 5

Guided learning hours: 45

Unit Summary

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.

Assessment Requirements/Evidence requirements:

If this unit is offered within a competence qualification (VCQ) it must be assessed in accordance with the IMI Assessment Strategy (*Annexe C*).

This unit must adhere to the IMI Knowledge Unit Syllabus as set out below:

Organisational Requirements

- a. explain the organisation's terms and conditions applicable to the acceptance of customer vehicles
- b. explain the content and limitations of vehicle and component warranties for the vehicles dealt with by your organisation
- c. detail what, if any, limits there are to the authority for accepting vehicles
- 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. the effect of resource availability upon the receipt of customer vehicles 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

Vehicle 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 vehicle on return to customer
- g. handover procedures

Consumer Legislation to include:

- a. consumer protection
- b. sale of goods
- c. data protection
- d. product liability
- e. health and safety
- f. discrimination

Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
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			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
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			

Learner name: _____ Date: _____

Learner signature: _____ Date: _____

Assessor signature: _____ Date: _____

Internal verifier signature: _____ Date: _____
(if sampled)

Unit 20: Knowledge of Lift Truck Driveline Units and Components

Unit reference number: J/602/6435

QCF Level: 2

Credit value: 6

Guided learning hours: 45

Unit Summary

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.

Assessment Requirements/Evidence requirements:

The construction and operation of lift truck driveline systems to include:

- a. power shift units
- b. hubs and bearings
- c. driveline shafts
- d. torque converters
- e. control valves
- f. final drive units
- g. motor control units

The operation of hydrostatic transmissions

- a. 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. 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)

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 transmission 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

Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria			Evidence type	Portfolio reference	Date
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 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				

Learner name: _____
Learner signature: _____
Assessor signature: _____
Internal verifier signature: _____
(if sampled)

Date: _____
Date: _____
Date: _____
Date: _____

Unit 21: Skills in Removing and Replacing Lift Truck Driveline Units and Components

Unit reference number: J/602/6449

QCF Level: 2

Credit value: 5

Guided learning hours: 45

Unit summary

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.

Assessment Requirements/Evidence requirements:

This unit must adhere to the IMI Skills Unit Assessment Requirements as set out below:

You must:

1. produce evidence to show you meet **all** of the Learning Outcomes
2. produce performance evidence resulting from work you have carried out in your training workshop as managed and organised by an approved centre
3. be observed by an assessor as defined by the IMI Assessment Strategy
4. be observed by an assessor removing and replacing **3 different units or components** from the list below. Evidence **must** include mechanical, electrical and hydraulic/fluid units or components.
 - powershift unit
 - torque converter
 - control valves
 - hubs and bearings
 - driveline shafts.

Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
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			

Learning outcomes		Assessment criteria			Evidence type	Portfolio reference	Date
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				
5	Be able to record information and make suitable recommendations	5.1	produce work records that are accurate, complete and passed to the relevant person(s) promptly in the format required				
		5.2	make suitable and justifiable recommendations for cost effective repairs				
		5.3	record and report any additional faults noticed during the course of their work promptly in the format required				

Learner name: _____
Learner signature: _____
Assessor signature: _____
Internal verifier signature: _____
(if sampled)

Date: _____
Date: _____
Date: _____
Date: _____

Unit 22: Competency in Health, Safety and Good Housekeeping in the Automotive Environment

Unit reference number: A/601/6338

QCF Level: 2

Credit value: 7

Guided learning hours: 60

Unit summary

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
- work safely at all times within the automotive environment, both as an individual and with others.

Assessment Requirements/Evidence requirements:

This unit must be assessed in accordance with the IMI Assessment Strategy (*Annexe C*) and adhere to the IMI Competency Unit Assessment Requirements as detailed below:

You must:

1. produce evidence to show you meet **all** of the Learning Outcomes
2. produce performance evidence resulting from work you have carried out on real vehicles in your normal workplace or as defined within the IMI VCQ Assessment Strategy as managed and organised by an approved centre when naturally occurring performance evidence does not occur at frequent intervals in your normal workplace or when safety is at risk
3. be observed by an assessor as defined in the IMI VCQ Assessment Strategy
4. produce evidence of use of personal and vehicle protection, cleaning the work environment and disposal of waste on **3** separate **occasions**.
5. be observed by your assessor on at least **1** occasion carrying out the above

6. produce evidence of identifying risks which may result from at least **2** of the items listed below:
 - 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
7. be observed by your assessor on at least **1** occasion carrying out the above
8. produce evidence of following at least **4** of the workplace policies listed below:
 - 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
9. be observed by your assessor following workplace policies on at least **1** occasion.

Learning outcomes and assessment criteria

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
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: 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			

Learning outcomes		Assessment criteria			Evidence type	Portfolio reference	Date
3	Be able to recognise and deal with dangers in order to work safely within the automotive workplace	2.4	perform housekeeping activities safely and in a way which minimizes 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				
		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				

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
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			

Learner name: _____ Date: _____

Learner signature: _____ Date: _____

Assessor signature: _____ Date: _____

Internal verifier signature: _____ Date: _____
(if sampled)

Unit 23: Competency in Supporting Job Roles in the Automotive Work Environment

Unit reference number: K/601/6366

QCF Level: 3

Credit value: 5

Guided learning hours: 40

Unit summary

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.

Assessment Requirements/Evidence requirements:

This unit must be assessed in accordance with the IMI Assessment Strategy (*Annexe C*) and adhere to the IMI Competency Unit Assessment Requirements as detailed below:

You must:

1. produce evidence to show you meet **all** of the Learning Outcomes
2. produce performance evidence resulting from work you have carried out on real vehicles in your normal workplace or as defined within the IMI VCQ Assessment Strategy as managed and organised by an approved centre when naturally occurring performance evidence does not occur at frequent intervals in your normal workplace or when safety is at risk
3. be observed by an assessor as defined in the IMI VCQ Assessment Strategy
4. produce evidence that you have worked well with others in the automotive industry
5. be observed by your assessor on at least **3** occasions carrying out the above whilst performing your normal work duties.

Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
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 manufacturer's 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			

Learner name: _____
Learner signature: _____
Assessor signature: _____
Internal verifier signature: _____
(if sampled)

Date: _____
Date: _____
Date: _____
Date: _____

Unit 24: Competency in Removing and Replacing Lift Truck Mechanical Handling, Chassis Units and Components

Unit reference number: A/602/6416

QCF Level: 2

Credit value: 10

Guided learning hours: 90

Unit summary

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.

Assessment Requirements/Evidence requirements:

This unit must be assessed in accordance with the IMI Assessment Strategy (*Annexe C*) and adhere to the IMI Competency Unit Assessment Requirements as detailed below:

You must:

1. produce evidence to show you meet **all** of the Learning Outcomes
2. produce performance evidence resulting from work you have carried out on real vehicles in your normal workplace or as defined within the IMI VCQ Assessment Strategy as managed and organised by an approved centre when naturally occurring performance evidence does not occur at frequent intervals in your normal workplace or when safety is at risk
3. be observed by an assessor as defined in the IMI VCQ Assessment Strategy
4. produce evidence of removing and replacing **4 different units or components**, which **must include items from:**
 - mechanical handling system
 - hydraulic system
 - steering system
 - braking system

Your evidence must include demonstration of competence **in each** aspect of mechanical, electrical and hydraulic/fluid units or component removal and replacement

5. be observed in your normal workplace on **at least 1 occasion** removing and replacing units and components from **2** of the following systems:

- mechanical handling system
- hydraulic system
- steering system
- braking system

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

Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
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			

Learning outcomes		Assessment criteria			Evidence type	Portfolio reference	Date
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: 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				
5	Be able to record information and make suitable recommendations	5.1	produce work records that are accurate, complete and passed to the relevant person(s) promptly in the format required				
		5.2	make suitable and justifiable recommendations for cost effective repairs				
		5.3	identify and report any expected delays in completion to the relevant person(s) promptly in the format required				
		5.4	record and report any additional faults noticed during the course of their work promptly in the format required				

Learner name: _____
Learner signature: _____
Assessor signature: _____
Internal verifier signature: _____
(if sampled)

Date: _____
Date: _____
Date: _____
Date: _____

Unit 25: Competency in Routine Lift Truck Maintenance

Unit reference number: D/602/6411

QCF Level: 2

Credit value: 7

Guided learning hours: 60

Unit summary

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.

Assessment Requirements/Evidence requirements:

This unit must be assessed in accordance with the IMI Assessment Strategy (*Annexe C*) and adhere to the IMI Competency Unit Assessment Requirements as detailed below:

You must:

1. produce evidence to show you meet **all** of the Learning Outcomes
2. produce performance evidence resulting from work you have carried out on real vehicles in your normal workplace or as defined within the IMI VCQ Assessment Strategy as managed and organised by an approved centre when naturally occurring performance evidence does not occur at frequent intervals in your normal workplace or when safety is at risk
3. be observed by an assessor as defined in the IMI VCQ Assessment Strategy
4. produce evidence from your normal workplace of carrying out servicing activities on **at least 3 different lift trucks**
5. be observed by your assessor carrying out a range of servicing activities on **at least 1 occasion.**

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

Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
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			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
4	Be able to carry out lift truck routine maintenance	4.1	<p>carry out lift truck inspections using prescribed methods, adhering to the correct specifications and tolerances for the vehicle and following:</p> <ul style="list-style-type: none"> a. the manufacturer's approved inspection methods b. recognised researched inspection methods c. health and safety requirements 			
		4.2	<p>carry out adjustments, replacement of components and replenishment of consumable materials following the manufacturer's current specification for:</p> <ul style="list-style-type: none"> a. the particular maintenance interval b. working methods and procedures c. use of equipment d. the tolerances relevant to the lift truck 			
		4.3	<p>ensure the examination methods identify accurately any lift truck system and or component problems falling outside the maintenance schedule are specified</p>			
		4.4	<p>ensure that inspected lift truck conforms to the operating specification and any legal requirements</p>			
		4.5	<p>ensure any comparison of the lift truck systems against specification accurately identifies any:</p> <ul style="list-style-type: none"> a. differences from the specification b. faults 			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
		4.6	use suitable testing methods to evaluate the performance of all replaced and adjusted components and systems accurately			
		4.7	work to the specified timescale for the activity			
5	Be able to record information and make suitable recommendations	5.1	produce work records that are accurate, complete and passed to the relevant person(s) promptly in the format required			
		5.2	make suitable and justifiable recommendations for cost effective repairs			
		5.3	identify and report any expected delays in completion to the relevant person(s) promptly in the format required			
		5.4	record and report any additional faults noticed during the course of their work promptly in the format required			

Learner name: _____ Date: _____
Learner signature: _____ Date: _____
Assessor signature: _____ Date: _____
Internal verifier signature: _____ Date: _____
(if sampled)

Unit 26: Competency in Removing and Replacing Lift Truck Power Plants Units and Components

Unit reference number: H/602/6412

QCF Level: 2

Credit value: 10

Guided learning hours: 90

Unit summary

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.

Assessment Requirements/Evidence requirements:

This unit must be assessed in accordance with the IMI Assessment Strategy (*Annexe C*) and adhere to the IMI Competency Unit Assessment Requirements as set out below:

You must:

1. produce evidence to show you meet **all** of the Learning Outcomes
2. produce performance evidence resulting from work you have carried out on real vehicles in your normal workplace or as defined within the IMI VCQ Assessment Strategy as managed and organised by an approved centre when naturally occurring performance evidence does not occur at frequent intervals in your normal workplace or when safety is at risk
3. be observed by an assessor as defined in the IMI VCQ Assessment Strategy
4. 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**
 - engine mechanical system
 - cooling system
 - air supply and exhaust systems
 - fuel and ignition systems
 - engine electrical systems
 - lubrication system

5. be observed by your assessor on at least **1** occasion removing and replacing components or units

*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

Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
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			

Learning outcomes	Assessment criteria			Evidence type	Portfolio reference	Date
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				
5 Be able to record information and make suitable recommendations	5.1	produce work records that are accurate, complete and passed to the relevant person(s) promptly in the format required				
	5.2	make suitable and justifiable recommendations for cost effective repairs				
	5.3	identify and report any expected delays in completion to the relevant person(s) promptly in the format required				
	5.4	record and report any additional faults noticed during the course of their work promptly in the format required				

Learner name: _____
Learner signature: _____
Assessor signature: _____
Internal verifier signature: _____
(if sampled)

Date: _____
Date: _____
Date: _____
Date: _____

Unit 27: Competency in Inspecting Lift Trucks Using Prescribed Methods

Unit reference number: J/602/6418

QCF Level: 2

Credit value: 4

Guided learning hours: 30

Unit summary

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.

Assessment Requirements/Evidence requirements:

This unit must be assessed in accordance with the IMI Assessment Strategy (*Annexe C*) and adhere to the IMI Competency Unit Assessment Requirements as detailed below:

You must:

1. produce evidence to show you meet **all** of the Learning Outcomes
2. produce performance evidence resulting from work you have carried out on real vehicles in your normal workplace or as defined within the IMI VCQ Assessment Strategy as managed and organised by an approved centre when naturally occurring performance evidence does not occur at frequent intervals in your normal workplace or when safety is at risk
3. be observed by an assessor as defined in the IMI VCQ Assessment Strategy
4. produce evidence of carrying out the different inspections from the following:
 - 2 pre-work inspections
 - 2 post-work inspections
5. be observed by your assessor **in your normal workplace** carrying out an inspection on **at least 1 occasion**

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

Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
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			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
4	Be able to carry out lift truck inspections using prescribed methods	4.1	<p>carry out lift truck inspections using prescribed methods, adhering to the correct specifications and tolerance and following:</p> <ul style="list-style-type: none"> 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	<p>ensure any comparison of the lift truck against specification accurately identifies any:</p> <ul style="list-style-type: none"> 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			
5	Be able to record information and make suitable recommendations	5.1	produce work records that are accurate, complete and passed to the relevant person(s) promptly in the format required			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
	5.2	make suitable and justifiable recommendations for future action based upon the inspection				
	5.3	identify and report any expected delays in completion to the relevant person(s) promptly in the format required				
	5.4	record and report any additional faults noticed during the course of their work promptly in the format required				

Learner name: _____ Date: _____
Learner signature: _____ Date: _____
Assessor signature: _____ Date: _____
Internal verifier signature: _____ Date: _____
(if sampled)

Unit 28: Competency in Removing and Replacing Lift Truck Electrical Units and Components

Unit reference number: M/602/6414

QCF Level: 2

Credit value: 10

Guided learning hours: 90

Unit summary

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.

Assessment Requirements/Evidence requirements:

This unit must be assessed in accordance with the IMI Assessment Strategy (*Annexe C*) and adhere to the IMI Competency Unit Assessment Requirements as detailed below:

You must:

1. produce evidence to show you meet **all** of the Learning Outcomes
2. produce performance evidence resulting from work you have carried out on real vehicles in your normal workplace or as defined within the IMI VCQ Assessment Strategy as managed and organised by an approved centre when naturally occurring performance evidence does not occur at frequent intervals in your normal workplace or when safety is at risk
3. be observed by an assessor as defined in the IMI VCQ Assessment Strategy
4. 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**
5. 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:
 - lighting system
 - wiper system
 - accelerator system
 - electric warning system

- direction control system
- hydraulic auxiliary system
- speed governing system
- starting system
- charging system
- traction control system
- electric drive, hydraulic and steering motors
- monitoring and instrumentation system.

*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.

Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
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: 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			

Learning outcomes	Assessment criteria			Evidence type	Portfolio reference	Date
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: 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					
5 Be able to record information and make suitable recommendations	5.1 produce work records that are accurate, complete and passed to the relevant person(s) promptly in the format required					
	5.2 make suitable and justifiable recommendations for cost effective repairs					
	5.3 identify and report any expected delays in completion to the relevant person(s) promptly in the format required					
	5.4 record and report any additional faults noticed during the course of their work promptly in the format required					

Learner name: _____ Date: _____
Learner signature: _____ Date: _____
Assessor signature: _____ Date: _____
Internal verifier signature: _____ Date: _____
(if sampled)

Unit 29: Competency in Identifying and Agreeing Motor Vehicle Customer Service Needs

Unit reference number: K/601/6383

QCF Level: 3

Credit value: 5

Guided learning hours: 40

Unit summary

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.

Assessment Requirements/Evidence requirements:

This unit must be assessed in accordance with the IMI Assessment Strategy (*Annexe C*) and adhere to the IMI Competency Unit Assessment Requirements as detailed below:

You must:

1. produce evidence to show you meet **all** of the Learning Outcomes
2. produce performance evidence resulting from work you have carried out on real vehicles in your normal workplace or as defined within the IMI VCQ Assessment Strategy as managed and organised by an approved centre when naturally occurring performance evidence does not occur at frequent intervals in your normal workplace or when safety is at risk
3. be observed by an assessor as defined in the IMI VCQ Assessment Strategy
4. produce evidence, including records, to show that you have dealt with **3 different customers**
5. be observed by your assessor in your normal workplace dealing with **at least 1 customer**

Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
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			

Learner name: _____
Learner signature: _____
Assessor signature: _____
Internal verifier signature: _____
(if sampled)

Date: _____
Date: _____
Date: _____
Date: _____

Unit 30: Competency in Removing and Replacing Lift Truck Driveline Units and Components

Unit reference number: L/602/6422

QCF Level: 2

Credit value: 10

Guided learning hours: 90

Unit summary

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.

Assessment Requirements/Evidence requirements:

This unit must be assessed in accordance with the IMI Assessment Strategy (*Annexe C*) and adhere to the IMI Competency Unit Assessment Requirements as detailed below:

You must:

1. produce evidence to show you meet **all** of the Learning Outcomes
2. produce performance evidence resulting from work you have carried out on real vehicles in your normal workplace or as defined within the IMI VCQ Assessment Strategy as managed and organised by an approved centre when naturally occurring performance evidence does not occur at frequent intervals in your normal workplace or when safety is at risk
3. be observed by an assessor as defined in the IMI VCQ Assessment Strategy
4. 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:
 - powershift unit
 - torque converter
 - control valves
 - hubs and bearings
 - driveline shafts

5. 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

*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

Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
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			

Learning outcomes		Assessment criteria			Evidence type	Portfolio reference	Date
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				
5	Be able to record information and make suitable recommendations	5.1	produce work records that are accurate, complete and passed to the relevant person(s) promptly in the format required				
		5.2	make suitable and justifiable recommendations for cost effective repairs				

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
	5.3	identify and report any expected delays in completion to the relevant person(s) promptly in the format required				
	5.4	record and report any additional faults noticed during the course of their work promptly in the format required				

Learner name: _____ Date: _____

Learner signature: _____ Date: _____

Assessor signature: _____ Date: _____

Internal verifier signature: _____ Date: _____
(if sampled)

Unit 31: Knowledge of how to Make Learning Possible through Demonstrations and Instruction

Unit reference number: T/601/6242

QCF Level: 3

Credit value: 5

Guided learning hours: 45

Unit summary

This unit enables the learner to develop an understanding of how to carry out demonstrations and instruction which will help the learner to learn. It includes demonstrating equipment, showing skills, giving instruction, deciding when to use demonstration or instruction, potential of technology based learning, checking on learners' progress and giving feedback.

Assessment Requirements/Evidence requirements:

If this unit is offered within a competence qualification (VCQ) it must be assessed in accordance with the IMI Assessment Strategy (*Annexe C*).

This unit must adhere to the IMI Knowledge Unit Syllabus as set out below:

Separate areas of demonstration which encourage learning. To include:

- a. demonstration is particularly applicable to learning manual skills
- b. learning to do something usually involves:
 - i. purpose – the aim or objective
 - ii. procedure – the most effective way of completing the task
 - iii. practice – all skills require practice to improve
- c. practical tasks are more quickly learnt through demonstration
- d. emphasis is required to body movements when demonstrating
- e. the demonstrator should encourage learners to ask questions
- f. emphasis should be placed upon key points whilst demonstrating
- g. any demonstration should ensure that all safety aspects are covered

Types of learning which are best achieved and supported through demonstrations. To include:

- a. types of learning:
 - i. psychomotor – measurement of manual skill performance
 - ii. cognitive – learning involving thought processes
 - iii. affective – demonstration of feelings, emotions or attitudes
- b. demonstration – involves learning to do something (Psychomotor domain)
- c. combination of instruction and practical demonstrations are very effective means of learning practical skills

How to structure demonstration and instruction sessions. To include:

- a. before the demonstration and/or instruction ensure that the following good practice is recognised:
 - i. identify key points
 - ii. relate theoretical underpinning knowledge to key points
 - iii. rehearse to ensure that all equipment is working
 - iv. ensure all students can see even small equipment and processes
 - v. time the demonstration
 - vi. consider how to make students participate
 - vii. consider how to emphasise safe working practices
- b. during the demonstration and/or instruction good practice is to:
 - i. give a clear introduction
 - ii. identify any tools/equipment
 - iii. determine the current audience level of knowledge
 - iv. complete the demonstration correctly (do not show how not to do it)
 - v. stress key points and show links between them
 - vi. monitor safety aspects
 - vii. check learner understanding
- c. after the demonstration(if possible)
 - i. enable the audience to practice the techniques
 - ii. provide feedback on their performance

How to identify individual learning needs

- a. diagnose the learning needs of your audience to include:
 - i. what competencies they already have
 - ii. what experience they have of the subject area
 - iii. what competencies they need to achieve
 - iv. what demonstration techniques are best suited to their needs
 - iv. how you will assess their needs have been met

What factors are likely to prevent learning. To include:

- a. language barriers
- b. physical barriers
- c. specialist knowledge
- d. pace of learning
- e. method of delivery
- f. environmental factors
- g. teaching styles
- h. dyslexia

How to check learner understanding and progress

- a. questionnaires
- b. verbal questioning
- c. observation
- d. assessment
- e. role play
- f. projects/assignments
- g. multi-choice questions
- h. simulation
- i. tests

How to organise information and prepare materials

- a. identify the course aim
- b. identify the subject aim
- c. identify the lesson aim
- d. complete a lesson plan — plan the teaching
- e. identify a series of 'cues' to be used during the lesson
- f. logically organise the information
- g. use suitable resources and equipment to maximise learning opportunities
- h. assess the learner's progress and understanding

Instructional techniques

- a. types of instructional techniques to include:
 - i. lectures
 - ii. handouts
 - iii. team teaching
 - iv. peer teaching
 - v. discussion – individual, group and peer
 - vi. question and answer
 - vii. multimedia
 - viii. seminars
 - ix. case studies
 - x. project/assignments

Environmental factors that affect learning

- a. environmental factors that should be considered before demonstration/instruction to include:
 - i. loud noises
 - ii. bright colours
 - iii. bright lights
 - iv. strong smells
 - v. atmosphere
 - vi. temperature
 - vii. classroom seating
 - viii. classroom layout
 - ix. bright lights

Health and safety factors that affect learning

- a. health and safety factors that should be considered before demonstration/instruction to include:
 - i. assessment of risk and hazards
 - ii. condition of electrical/electronic equipment
 - iii. position of cables and wires
 - iv. safety of equipment used in demonstration/instruction
 - v. condition of classroom equipment/furniture/structure
 - vi. suitable protective clothing/equipment

Analysis of demonstration/instruction

- a. analysis of demonstration/instruction to include:
 - i. feedback from students
 - ii. feedback from colleagues
 - iii. organisational quality assessment
 - iv. feedback from external organisations
 - v. awarding body requirements

Developments in learning. To include:

- a. multimedia- based materials
- b. web- based materials
- c. interactive materials

How to choose and prepare appropriate materials. To include:

- a. putting information in order
- b. deciding whether the language used is appropriate
- c. type of material ie paper and technology based etc

Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
1	Understand the nature and role of demonstrations and instruction	1.1	classify the separate areas of demonstrations which encourage learning			
		1.2	identify which types of learning are best achieved and supported through demonstrations			
		1.3	explain how to identify and use different learning opportunities			
		1.4	explain how to structure demonstrations and instruction sessions			
		1.5	explain how to choose from a range of demonstration techniques			
2	Understand the principles and concepts of demonstration and instruction	2.1	describe how to put learners at ease and encourage them to take part			
		2.2	justify the choice between demonstration and instruction as a learning method			
		2.3	explain how to identify individual learning needs			
		2.4	clarify which factors are likely to prevent learning and how to overcome them			
		2.5	explain how to check learners' understanding and progress			
		2.6	explain how to choose and prepare appropriate materials			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
		2.7	explain the separate areas of instructional techniques which encourage learning			
		2.8	describe which types of learning are best achieved and supported through instruction			
3	Understand the external factors influencing human resource development	3.1	explain how to make sure everybody acts in line with health, safety and environmental protection, legislation and best practice			
		3.2	analyse developments in technology based learning and new ways of delivery			

Learner name: _____ Date: _____

Learner signature: _____ Date: _____

Assessor signature: _____ Date: _____

Internal verifier signature: _____ Date: _____
(if sampled)

Unit 32: Skills in how to Make Learning Possible through Demonstrations and Instruction

Unit reference number: Y/601/6282

QCF Level: 3

Credit value: 5

Guided learning hours: 40

Unit summary

This unit will help the learner to develop the skills required to carry out demonstrations and instruction which will help the learner to learn. It includes demonstrating equipment, showing skills, giving instruction, deciding when to use demonstration or instruction, potential of technology based learning, checking on learners' progress and giving feedback.

Assessment Requirements/Evidence requirements:

This unit must adhere to the IMI Skills Unit Assessment Requirements as set out below:

You must:

1. produce evidence to show you meet **all** of the Learning Outcomes
2. produce performance evidence resulting from work you have carried out in your training workshop as managed and organised by an approved centre
3. be observed by an assessor as defined by the IMI Assessment Strategy
4. provide **1 record** of an activity which has been a combination of demonstration and instruction
5. provide records of an **observation**, which covers **a combination** of **demonstration** and **instruction**

It is expected that the **records** must include evidence to show how you:

- decided on the sequence of the demonstration
- ensured that the demonstration was accurate and realistic
- identified which learning outcomes were achieved
- ensured a safe environment for the demonstration and allowed all learners to see the demonstration clearly

In preparing the record you should consider:

- which types of learning are best achieved and supported through demonstrations
- how to choose between instruction and demonstration as learning methods
- how to identify individual learning needs
- which factors are likely to prevent learning and how to overcome them
- how to choose and prepare appropriate materials, including technology- based materials
- which types of learning are best achieved through instruction
- how to make sure everybody acts in line with health, safety and environmental protection legislation and best practice
- how to analyse developments in learning and new ways of delivery, including technology- based learning

It is also expected that evidence from your observations **will show** how you:

- structured the demonstration so that the learner got the most out of it
- encouraged learners to ask questions and get explanations at appropriate stages in the demonstration
- gave learners the opportunities to practise the skill being demonstrated
- gave learners positive feedback
- reinforced learning by repeating demonstration
- responded to the needs of learners during the demonstration
- reduced distractions and disruptions as much as possible
- matched instruction to the needs of learners
- ensured that the manner, level and speed of the instruction encourages learners to take part
- regularly check that learners understand and adapt instruction as appropriate
- gave learners positive feedback on the learning experience and the outcome achieved
- identified anything that prevented learning and reviewed this with the learner.

Evidence from **real** or **simulated** activities and **role play is** acceptable for this unit.

Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
1	Be able to demonstrate skills and methods to learners	1.1	perform demonstrations based on an analysis of the skills needed and the order in which they must be learned			
		1.2	perform demonstrations that are accurate and realistic			
		1.3	perform structured demonstrations so that the learner can get the most out of it			
		1.4	perform demonstrations whilst encouraging learners to ask questions and get explanation at appropriate stages in the demonstration			
		1.5	provide positive feedback to learners whilst they are being given the opportunity to practise the skills that have been demonstrated			
		1.6	perform additional demonstrations of skills being taught to reinforce learning			
		1.7	perform demonstrations in a safe environment which also allows learners to see clearly			
		1.8	respond to the needs of the learners during demonstrations			
		1.9	reduce distractions and disruptions as much as possible			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
2	Be able to instruct learners	2.1	implement instruction which is matched to the needs of learners			
		2.2	use identified learning outcomes which can be achieved through instruction			
		2.3	perform instruction, ensuring that the manner, level and speed of the instruction encourages learners to take part			
		2.4	perform instruction whilst regularly checking that the learners understand and adapt instruction as appropriate			
		2.5	give learners positive feedback on the learning experience and the outcomes achieved			
		2.6	carry out a review with the learners to identify anything that prevented learning and adapt instruction as appropriate			

Learner name: _____ Date: _____
Learner signature: _____ Date: _____
Assessor signature: _____ Date: _____
Internal verifier signature: _____ Date: _____
(if sampled)

Unit 33: Knowledge of Diagnosis and Rectification of Lift Truck Power Plant Engine Unit Faults

Unit reference number: M/602/6431

QCF Level: 3

Credit value: 6

Guided learning hours: 45

Unit summary

This unit enables the learner to develop an understanding of diagnosis and rectification of lift truck power plant mechanical, hydraulic, fluid, electrical and electronic systems. It also covers the evaluation of performance of the repaired system.

Assessment Requirements/Evidence requirements:

If this unit is offered within a competence qualification (VCQ) it must be assessed in accordance with the IMI Assessment Strategy (*Annexe C*).

This unit must adhere to the IMI Knowledge Unit Syllabus as set out below:

The construction and operation of lift truck power plant systems to include:

- a. SI fuel systems
- b. CI fuel systems
- c. ignition systems
- d. engine management
- e. advanced valve mechanisms
- f. pressure charged induction systems
- g. exhaust emission reduction systems

How to examine, measure and make suitable adjustments to the components including

- a. settings
- b. input and output values
- c. voltages
- d. current consumption

- e. resistance
- f. output patterns with oscilloscope
- g. pressures
- h. condition
- i. wear and performance

Single and multi-point injection systems

- a. The operation and construction of single and multi-point injection systems including:
 - i. types of air flow sensor
 - ii. fuel supply system
 - iii. fuel pump
 - iv. filter
 - v. fuel regulator
 - vi. injectors
 - vii. sequential injection
 - viii. continuous injection
 - ix. semi-continuous injection
 - x. electronic control unit (ECU)
 - xi. injector pulse width
 - xii. sensors
- b. The operation of each system under various operating conditions including:
 - i. cold starting
 - ii. warm up
 - iii. hot starting
 - iv. acceleration
 - v. deceleration
 - vi. cruising
 - vii. full load
- c. engine speed limiting and knock sensing

Engine management

- a. the function and purpose of engine management systems.
- b. the difference between analogue, digital, programmable and non-programmable systems
- c. open loop and closed loop control, types of input and output devices
- d. the function and operation of digital components and systems
- e. the operation of engine management systems under various conditions

Valve mechanisms

- a. the reasons for variable valve timing and multi-valve arrangements and the effect on performance
- b. layout of multi-valve arrangements, components, operation and drive arrangements
- c. construction features and operation of variable valve timing engines and electronic control

Pressure charged induction systems

- a. the meaning of volumetric efficiency; explain the effect of volumetric efficiency on engine performance, torque and power
- b. the methods used to improve volumetric efficiency:
 - i. variable valve timing
 - ii. turbo-charging
 - iii. supercharging
 - iv. intercoolers
- c. the operation of turbo-chargers and the purpose of:
 - i. turbo-charging
 - ii. supercharging
 - iii. intercoolers
 - iv. waste gates
 - v. exhaust gas recirculation
- d. advantages and disadvantages of pressure charging induction systems

Terms associated with combustion

- a. flame travel, pre-ignition and detonation
- b. fuel properties:
 - i. octane rating
 - ii. flash point
 - iii. fire point
 - iv. volatility
 - v. composition of petrol and diesel fuels
 - vi. hydro-carbon content
- c. composition of carbon fuels (petrol and diesel):
 - i. % hydrogen and carbon
 - ii. composition of air
 - iii. % oxygen
 - iv. % nitrogen

- d. combustion process for spark ignition and compression ignition engines:
 - i. air fuel ratio
 - ii. lambda ratio
 - iii. stoichiometric ratio
- e. the by-products of combustion for different engine conditions and fuel mixtures:
 - i. CO
 - ii. CO₂
 - iii. O
 - iv. N
 - v. H₂O
 - vi. NO_x
- f. the legal requirements for exhaust emissions:
 - i. LOLER/PUWER requirements
 - ii. EURO 3
 - iii. 4 & 5 regulations

Assessment, repair and restoration of mechanical engine components

- a. how engine mechanical components are assessed and measured for wear and serviceability:
 - i. cylinder bores
 - ii. cylinder heads
 - iii. crankshaft journals
 - iv. valve faces
 - v. valve guides
 - vi. valve seats
 - vii. camshafts
- b. the methods used for the repair and restoration of engine components

Symptoms and causes of faults found in lift truck power plant systems to include

- a. engine mechanical components
- b. ignition systems
- c. fuel systems
- d. engine management system
- e. pressure charged induction systems
- f. exhaust emission reduction systems

Symptoms and faults in engine mechanical systems and components

- a. symptoms and faults related to:
 - i. worn cylinders
 - ii. cylinder liners
 - iii. pistons
 - iv. piston rings
 - v. crankshaft
 - vi. camshaft
 - vii. bearings
 - viii. cylinder head and gasket
 - ix. valves
 - x. valve seats and valve guides
 - xi. cambelts
 - xii. lubrication system and components
 - xiii. oil pump
 - xiv. relief valve
 - xv. filter
 - xvi. turbo-charger
 - xvii. supercharger

Diagnosis of faults in engine mechanical systems and components

- a. interpret information for:
 - i. diagnostic tests
 - ii. manufacturer's vehicle and equipment specifications
 - iii. use of equipment
 - iv. testing procedures
 - v. test plans
 - vi. legal requirements
- b. the preparation of tools and equipment for use in diagnostic testing and assessment
- c. systematic assessment, testing and inspection of engine components and systems including:
 - i. mechanical system & component condition
 - ii. engine balance
 - iii. power balance
 - iv. performance and operation
 - v. wear
 - vi. run out
 - vii. alignment

- d. use of appropriate tools and equipment including:
 - i. compression gauges
 - ii. leakage testers
 - iii. cylinder balance tester
 - iv. pressure gauges
 - v. micrometers
 - vi. vernier gauges
- e. evaluate and interpret test results from diagnostic testing
- f. compare test result and values with vehicle manufacturer's specifications and settings
- g. the procedures for dismantling, components and systems and the use of appropriate equipment and procedures
- h. assess, examine and measure components including:
 - i. settings
 - ii. values
 - iii. condition
 - iv. wear and performance of components and systems
- i. probable faults
 - i. malfunctions
 - ii. incorrect settings
 - iii. wear
- j. rectification or replacement procedures
- k. evaluate operation of components and systems following diagnosis and repair to confirm system performance

Faults and symptoms in ignition systems

- a. ignition system failure or malfunctions including:
 - i. no spark
 - ii. misfiring
 - iii. backfiring
 - iv. cold or hot starting problems
 - v. poor performance
 - vi. pre-ignition
 - vii. detonation
 - viii. exhaust emission levels
 - ix. fuel consumption
 - x. low power
 - xi. unstable idle speed

Common faults and symptoms in electronic LPG and diesel injection systems

- a. LPG and diesel injection system failures or malfunctions including:
 - i. cold or hot starting problems
 - ii. poor performance
 - iii. exhaust emissions
 - iv. high fuel consumption
 - v. erratic running
 - vi. low power
 - vii. unstable idle speed

Faults and symptoms in engine management systems

- a. engine management system failure or malfunctions including:
 - i. misfiring
 - ii. backfiring
 - iii. cold or hot starting problems
 - iv. poor performance
 - v. pre-ignition
 - vi. detonation
 - vii. exhaust emission levels
 - viii. fuel consumption
 - ix. low power
 - x. unstable idle speed

Diagnosis of faults in electronic ignition, petrol/LPG and diesel injection and engine management systems

- a. locate and interpret information for:
 - i. diagnostic tests
 - ii. manufacturer's vehicle and equipment specifications
 - iii. use of equipment
 - iv. testing procedures
 - v. test plans
 - vi. fault codes
 - vii. legal requirements
- b. the preparation of tools and equipment for use in diagnostic testing and assessment
- c. conduct systematic assessment, testing of engine systems including:
 - i. component condition and performance
 - ii. component settings
 - iii. component values
 - iii. electrical and electronic values
 - iv. system performance and operation
 - v. use of appropriate tools and equipment including gauges

- vi. multi-meter
- vii. breakout box
- viii. oscilloscope
- ix. diagnostic tester
- x. manufacturer's dedicated equipment
- xi. exhaust gas analyser
- xii. fuel flow meter
- xiii. pressure gauges
- d. evaluate and interpret test results from diagnostic testing
- e. compare test result, values and fault codes with vehicle manufacturer's specifications and settings
- f. the procedures for dismantling, components and systems using appropriate equipment
- g. assess, examine and measure components including:
 - i. settings
 - ii. input and output values
 - iii. voltages
 - iv. current consumption
 - v. resistance
 - vi. output patterns with oscilloscope
 - vii. condition
 - viii. wear and performance of components and systems
- h. identify probable faults and indications of:
 - i. faults
 - ii. malfunctions
 - iii. incorrect settings
 - iv. wear
 - v. values
 - vi. inputs and outputs
 - vii. fault codes
- i. rectification or replacement procedures
- j. evaluation and the operation of components and systems following diagnosis and repair to confirm system performance

Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria			Evidence type	Portfolio reference	Date
1	Understand how the lift truck diesel and LPG systems operate	1.1	identify lift truck engine system components				
		1.2	explain the construction and operation of lift truck power plant systems				
		1.3	explain the interaction between electrical, electronic and mechanical components within lift truck power plant systems				
		1.4	explain how electrical systems interlink and interact, including multiplexing				
		1.5	compare lift truck power plant system components and assemblies against alternatives to identify differences in construction and operation				
		1.6	identify the engineering principles that are related to lift truck power plant systems				
				a. volumetric efficiency b. flame travel, pre ignition and detonation c. fuel properties d. composition of carbon fuels e. combustion process f. legal requirements for exhaust emissions			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
2	Understand how to diagnose and rectify faults in lift truck power plant systems	2.1	analyse symptoms and causes of faults found in lift truck power plant systems			
		2.2	explain systematic diagnostic techniques used in identifying power plant system faults			
		2.3	explain how to examine, measure and make suitable adjustments to the components			
		2.4	explain how to carry out the diagnosis and rectification activities in order to correct the faults in the lift truck power plant systems			
		2.5	explain how to select, prepare and use diagnostic and rectification equipment for lift truck power plant systems			
		2.6	explain how to evaluate and interpret test results found in diagnosing lift truck power plant system faults against manufacturer specifications and settings			
		2.7	state why rectification methods are justified when related to lift truck power plant system faults			
		2.8	explain how to evaluate the operation of components and systems following diagnosis and repair to confirm system performance			

Learner name: _____
Learner signature: _____
Assessor signature: _____
Internal verifier signature: _____
(if sampled)

Date: _____
Date: _____
Date: _____
Date: _____

Unit 34: Knowledge of Diagnosis and Rectification of Lift Truck Electrical Units and Component Faults

Unit reference number: Y/602/6424

QCF Level: 3

Credit value: 6

Guided learning hours: 45

Unit summary

This unit enables the learner to develop an understanding of diagnosis and rectification of lift truck electrical systems and their units. It also covers the evaluation of performance of the systems.

Assessment Requirements/Evidence requirements:

If this unit is offered within a competence qualification (VCQ) it must be assessed in accordance with the IMI Assessment Strategy (*Annexe C*).

This unit must adhere to the IMI Knowledge Unit Syllabus as set out below:

The construction and operation of lift truck electrical systems including

- a. lighting systems
- b. wiper systems
- c. accelerator systems
- d. warning devices
- e. directional control devices
- f. hydraulic auxiliary systems
- g. speed governing systems
- h. starting systems
- i. charging systems
- j. traction control systems
- k. electric drive, hydraulic and steering motors
- l. traction battery and charger
- m. monitoring and instrumentation systems

How to examine, measure and make suitable adjustments to components including:

- a. settings
- b. input and output values
- c. voltages
- d. current consumption
- e. resistance
- f. input and output patterns with oscilloscope (including frequency and duty cycle measurements)
- g. condition
- h. wear and performance

How to select, prepare and use diagnostic and rectification equipment for lift truck electrical systems including:

- a. voltmeters
- b. ammeters
- c. ohmmeters
- d. multi-meters
- e. battery testing equipment
- f. dedicated and computer based diagnostic equipment
- g. oscilloscopes

Operating principles of external lighting systems and multiplexing systems

- a. to include all external lighting systems and a good knowledge of multiplexing systems.

Operation of advanced traction power systems (including traction battery charging)

- a. the construction and operation of multi-volt traction batteries and their chargers

The different types of SCR traction control systems and components

- a. components should include:
 - i. SCR/thyristor
 - ii. capacitors
 - iii. diodes
 - iv. inductors
 - v. shunts
 - vi. potentiometers
 - vii. encoders
 - viii. transformers

Function of component parts in SCR traction control systems

- a. components must include:
 - i. SCR/thyristor
 - ii. capacitors
 - iii. diodes
 - iv. inductors
 - v. shunts
 - vi. potentiometers
 - vii. encoders
 - viii. transformers
 - ix. accelerator control
 - x. series wound dc motor
 - xi. logic controller

Operating principles of SCR traction control systems

- a. operating principles of the following:
 - i. SCR commutation circuit
 - ii. current sensing circuit
 - iii. SCR control circuit
 - iv. series wound dc motor
 - v. SCR motor circuit
 - vi. logic controller
 - vii. plugging and regenerative braking
 - viii. fly back circuit
 - ix. field weakening circuit
 - x. current limit

Common faults and testing methods associated with SCR traction control systems

- a. fault diagnosis for:
 - i. SCR commutation circuit
 - ii. SCR control circuit
 - iii. SCR motor circuit
 - iv. series wound dc motor
 - v. logic controller
 - vi. fail safe conditions
 - vii. fierce/ineffective electric braking
 - viii. earth leakage fault

The different types of MOSFET and components

- a. systems must include:
 - i. depletion
 - ii. enhancement
 - iii. P.channel

- iv. N.channel
- v. current sensor
- vi. suppression
- vii. accelerator control

Function and operating principles of components for MOSFET traction control systems

- a. components must include:
 - i. depletion
 - ii. enhancement
 - iii. P.channel
 - iv. N.channel
 - v. current sensor
 - vi. suppression
 - vii. accelerator control

Common faults and testing methods associated with MOSFET traction control systems

- a. faults must include:
 - i. open circuited MOSFET
 - ii. short circuited MOSFET
 - iii. fail safe conditions
- b. interpret fault code and led flashing diagnosis

The different types of AC Traction control systems and components

- a. systems and components must include:
 - i. inverters
 - ii. ac motors (induction and synchronous)
 - iii. encoders
 - iv. accelerator control

The function of components in AC Traction control systems

- a. systems include:
 - i. inverters
 - ii. AC motors (induction and synchronous)
 - iii. encoders
 - iv. accelerators

Operating principles of AC Traction control systems

- a. operation of ac control system
 - i. inverters
 - ii. AC motors (induction and synchronous)
 - iii. encoders
 - iv. accelerators

Faults and testing methods associated with AC Traction control systems

- a. faults to include:
 - i. open circuited inverter
 - ii. short circuited inverter
 - iii. fail safe conditions
- b. interpret fault code and led flashing diagnosis

SEM components

- a. components to include:
 - i. SEM configuration
 - ii. shunt wound dc motor
 - iii. line contactor
 - iv. accelerator control

The function of component parts in Separately Excited Motor (SEM) Control systems

- a. components to include
 - i. SEM configuration
 - ii. shunt wound dc motor
 - iii. line contactor
 - iv. accelerator control

Operating principles of Separately Excited Motor (SEM) Control systems

- a. operation of the following:
 - i. SEM controller
 - ii. shunt wound dc motor
 - iii. line contactor
 - iv. accelerator control

Faults and testing methods associated with Separately Excited Motor (SEM) Control Systems

- a. faults to include:
 - i. SEM controller
 - ii. shunt wound motors
 - iii. line contactors
 - iv. accelerator control
- b. interpret fault code and led flashing diagnosis

The different electronic steering system components

- a. components must include:
 - i. Tachogenerators
 - ii. Potentiometers
 - iii. encoders
 - iv. permanent magnet motors
 - v. steering controller

The function of electronic steering components

- a. components and systems must include:
 - i. Tachogenerators
 - ii. Potentiometers
 - iii. encoders
 - iv. permanent magnet motors
 - v. steering controller

Operating principles, faults and testing methods of electronic steering systems

- a. principles, fault diagnosis and testing for:
 - i. Tachogenerators
 - ii. Potentiometers
 - iii. encoders
 - iv. permanent magnet motors
 - v. steering controller

Faults and testing methods associated with electronic steering systems

- a. faults to include:
 - i. loss of direction
 - ii. erratic steering
 - iii. no steering
 - iv. heavy steering
 - v. slow responsive steering
- b. interpret fault code and led flashing diagnosis

Diagnose faults in traction power systems (including traction battery chargers)

- a. how to locate and interpret information for:
 - i diagnostic tests
 - ii. manufacturer's Lift Truck and equipment specifications
 - iii. use of equipment
 - iv. testing procedures

- v. test plans
- vi. fault codes
- vii. legal requirements
- b. the preparation of tools and equipment for use in diagnostic testing and assessment
 - i. tests to include:
 - ii. pulse-equalising
 - iii. voltage and current test output
 - iv. calculating charge rates based upon capacity
- c. locate common faults to include:
 - i. not holding charge
 - ii. sulphating
 - iii. undercharging/overcharging
 - iv. internal open/short circuit
 - v. high resistance
 - vi. terminal corrosion
 - vii. plate deterioration

An overview of truck and system guidance methods

- a. wire guidance
- b. under floor systems
- c. laser and infrared technology,
- d. GPS

Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
1	Understand vehicle electrical and electronic principles	1.1	explain the principles of electrical inputs, outputs, voltages and oscilloscope patterns, digital and fibre optics			
		1.2	explain the principles of sensor inputs, computer processing and actuator outputs			
		1.3	identify sensor types (passive and active)			
		1.4	identify the electrical principles that are related to light vehicle electrical circuits: <ul style="list-style-type: none"> a. ohms law b. voltage c. power d. current (AC and DC) e. resistance f. magnetism g. electromagnetism and electromagnetic induction h. digital and fibre optic principles i. electrical units and symbols j. electrical and electronic terminology k. relevant electrical safety 			

Learning outcomes		Assessment criteria			Evidence type	Portfolio reference	Date
2	Understand how lift truck electrical systems operate	2.1	identify lift truck electrical system components				
		2.2	explain the construction and operation of lift truck electrical systems				
		2.3	explain the interaction between electrical, electronic and mechanical components within the system defined				
		2.4	explain the operation of the electrical and electronic systems for electric, gas and diesel powered lift trucks				
		2.5	explain how electrical systems interlink and interact, including multiplexing				
		2.6	compare lift truck electrical system components and assemblies against alternatives to identify differences in construction and operation				
3	Understand how to diagnose and rectify faults in electrical systems	3.1	analyse symptoms and causes of faults found in lift truck electrical systems				
		3.2	explain systematic diagnostic techniques used in identifying lift truck electrical system faults				
		3.3	explain how to examine, measure and make suitable adjustments to components				
		3.4	explain how to carry out the rectification activities in order to correct the faults in the lift truck electrical systems				
		3.5	explain how to select, prepare and use diagnostic and rectification equipment for lift truck electrical systems				

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
	3.6	explain how to evaluate and interpret test results found in diagnosing lift truck electrical system faults against manufacturer specifications and settings				
	3.7	state why rectification methods are justified when related to lift truck electrical system faults				
	3.8	explain how to evaluate the operation of components and systems following diagnosis and repair to confirm system performance				

Learner name: _____ Date: _____

Learner signature: _____ Date: _____

Assessor signature: _____ Date: _____

Internal verifier signature: _____ Date: _____
(if sampled)

Unit 35: Skills in Diagnosing and Rectifying Lift Truck Electrical Units and Component Faults

Unit reference number: D/602/6439

QCF Level: 3

Credit value: 5

Guided learning hours: 45

Unit summary

This unit will help the learner to develop the skills required to demonstrate they can diagnose and rectify lift truck electrical system faults. It also covers the evaluation of performance of the replaced or repaired units and systems.

Assessment Requirements/Evidence requirements:

This unit must adhere to the IMI Skills Unit Assessment Requirements as set out below:

You must:

1. produce evidence to show you meet **all** of the Learning Outcomes
2. produce performance evidence resulting from work you have carried out in your training workshop as managed and organised by an approved centre
3. be observed by an assessor as defined by the IMI Assessment Strategy
4. be observed by an assessor carrying out diagnosis and rectification activities from **3 different systems out of the 13 listed below**, which covers the learning outcomes. The fault should involve a **2 or more** step diagnostic activity:
 - lighting systems
 - wiper systems
 - accelerator systems
 - warning devices
 - direction control systems
 - hydraulic auxiliary systems
 - speed governing systems
 - starting systems
 - charging systems

- traction control systems
- electric drive, hydraulic and steering motors
- traction battery and charger
- monitoring and instrumentation systems

Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
1	Be able to work safely when carrying out lift truck electrical diagnostic and rectification activities	1.1	wear suitable personal protective equipment and coverings when carrying out lift truck diagnostic and rectification activities			
		1.2	work in a way that minimises the risk of damage or injury to the lift truck, people or environment			
2	Be able to use relevant information to carry out the task	2.1	select suitable sources of technical information to support the lift truck diagnostic and rectification activities including: a. technical data b. diagnostic test procedures			
		2.2	use sufficient diagnostic information in a systematic way to enable an accurate diagnosis of lift truck electrical system faults			
3	Be able to use appropriate tools and equipment	3.1	select the appropriate tools and equipment necessary for diagnostic and rectification activities			
		3.2	ensure that equipment has been calibrated to meet manufacturers' and legal requirements			
		3.3	use the equipment required, correctly and safely throughout all lift truck electrical diagnostic and rectification activities			

Learning outcomes		Assessment criteria			Evidence type	Portfolio reference	Date
4	Be able to carry out lift truck diagnosis, rectification and test activities	4.1	use diagnostic methods that are relevant to the symptoms presented				
		4.2	evaluate your assessment of dismantled sub-assemblies and identify their condition and suitability for repair or replacement accurately				
		4.3	carry out all diagnostic and rectification activities following: a. manufacturers' instructions b. recognised researched repair methods c. workplace procedures d. health and safety requirements				
		4.4	ensure all repaired and replaced components and units conform to the operating specification and any legal requirements				
		4.5	adjust components and units correctly to ensure that they operate to meet system requirements				
		4.6	use testing methods that are suitable for assessing the performance of the system rectified				
		4.7	complete all system diagnostic activities within the agreed timescale				

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
5	Be able to record information and make suitable recommendations	5.1	inform the relevant person(s) promptly where repairs are uneconomic or unsatisfactory to perform			
		5.2	record and report any additional faults you notice during the course of work promptly			
		5.3	ensure your records are accurate, complete and passed to the relevant person(s) promptly in the format required			
		5.4	make cost effective recommendations for rectification based upon the analysis of the diagnostic information gained			

Learner name: _____ Date: _____

Learner signature: _____ Date: _____

Assessor signature: _____ Date: _____

Internal verifier signature: _____ Date: _____
(if sampled)

Unit 36: Skills in Diagnosing and Rectifying Lift Truck Power Plant Engine Unit Faults

Unit reference number: A/602/6447

QCF Level: 3

Credit value: 5

Guided learning hours: 45

Unit Summary

This unit allows the learner to develop skills to diagnose and rectify lift truck power plant mechanical, electrical, hydraulic and fluid system faults. It also covers the evaluation of performance of the replaced or repaired units and systems.

Assessment Requirements/Evidence requirements:

This unit must adhere to the IMI Skills Unit Assessment Requirements as set out below:

You must:

1. produce evidence to show you meet **all** of the Learning Outcomes
2. produce performance evidence resulting from work you have carried out in your training workshop as managed and organised by an approved centre
3. be observed by an assessor as defined by the IMI Assessment Strategy
4. be observed by an assessor diagnosing and rectifying faults occurring in **each** of the **engine** systems listed. The faults should involve a **2 or more** step diagnostic activity:
 - engine mechanical systems
 - engine electrical and electronic systems
 - engine hydraulic and fluid systems.

Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
1	Be able to work safely when carrying out lift truck power plant unit diagnostic and rectification activities	1.1	wear suitable personal protective equipment and coverings when carrying out lift truck diagnostic and rectification 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 diagnostic and rectification activities including: a. technical data b. diagnostic test procedures			
		2.2	use sufficient diagnostic information in a systematic way to enable an accurate diagnosis of lift truck power plant system faults			
3	Be able to use appropriate tools and equipment	3.1	select the appropriate tools and equipment necessary for diagnostic and rectification activities			
		3.2	check that equipment has been calibrated to meet manufacturers' and legal requirements			
		3.3	use the equipment required, correctly and safely throughout all lift truck power plant diagnostic and rectification activities			
4	Be able to carry out lift truck power plant diagnosis, rectification and test activities	4.1	use diagnostic methods that are relevant to the symptoms presented			

Learning outcomes	Assessment criteria		Evidence type	Portfolio reference	Date
	4.2	evaluate your assessment of dismantled sub-assemblies and identify their condition and suitability for repair or replacement accurately			
	4.3	carry out all diagnostic and rectification activities following: <ul style="list-style-type: none"> a. manufacturers' instructions b. recognised researched repair methods c. workplace procedures d. health and safety requirements 			
	4.4	ensure all repaired and replaced components and units conform to the operating specification and any legal requirements			
	4.5	adjust components and units correctly to ensure that they operate to meet system requirements			
	4.6	ensure testing methods are suitable for assessing the performance of the system rectified			
	5	5.1	produce work records that are accurate, complete and passed to the relevant person(s) promptly in the format required		
5.2		make suitable and justifiable recommendations for cost effective repairs			
5.3		record and report any additional faults noticed during the course of their work promptly in the format required			

Learner name: _____
Learner signature: _____
Assessor signature: _____
Internal verifier signature: _____
(if sampled)

Date: _____
Date: _____
Date: _____
Date: _____

Unit 37: Skills in Diagnosing and Rectifying Lift Truck Mechanical Handling and Chassis System Faults

Unit reference number: F/602/6448

QCF Level: 3

Credit value: 5

Guided learning hours: 45

Unit Summary

This unit allows the learner to develop skills to diagnose and rectify lift truck mechanical handling, braking and steering systems faults. It also covers the evaluation of performance of the replaced or repaired units and systems.

Assessment Requirements/Evidence requirements:

This unit must adhere to the IMI Skills Unit Assessment Requirements as set out below:

You must:

1. produce evidence to show you meet **all** of the Learning Outcomes
2. produce performance evidence resulting from work you have carried out in your training workshop as managed and organised by an approved centre
3. be observed by an assessor as defined by the IMI Assessment Strategy
4. be observed by an assessor diagnosing and rectifying at least **1** fault from **each** system listed. The fault should involve a **2 or more** step diagnostic activity:
 - mechanical handling system
 - steering system
 - braking system

Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
1	Be able to work safely when carrying out lift truck mechanical handling and chassis diagnostic and rectification activities	1.1	wear suitable personal protective equipment and coverings when carrying out lift truck diagnostic and rectification 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 diagnostic and rectification activities including: a. technical data b. diagnostic test procedures			
		2.2	use sufficient diagnostic information in a systematic way to enable an accurate diagnosis of lift truck mechanical handling and chassis system faults			
3	Be able to use appropriate tools and equipment	3.1	select the appropriate tools and equipment necessary for diagnostic and rectification activities			
		3.2	check that equipment has been calibrated to meet manufacturers' and legal requirements			
		3.3	use the equipment required, correctly and safely throughout all lift truck mechanical handling and chassis system diagnostic and rectification activities			

Learning outcomes		Assessment criteria			Evidence type	Portfolio reference	Date
4	Be able to carry out lift truck mechanical handling and chassis diagnosis, rectification and test activities	4.1	use diagnostic methods that are relevant to the symptoms presented				
		4.2	evaluate your assessment of dismantled sub-assemblies and identify their condition and suitability for repair or replacement accurately				
		4.3	carry out all diagnostic and rectification activities following: a. manufacturers' instructions b. recognised researched repair methods c. workplace procedures d. health and safety requirements				
		4.4	ensure all repaired and replaced components and units conform to the vehicle operating specification and any legal requirements				
		4.5	adjust components and units correctly to ensure that they operate to meet system requirements				
		4.6	demonstrate testing methods that are suitable for assessing the performance of the system rectified				

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
5	Be able to record information and make suitable recommendations	5.1	produce work records that are accurate, complete and passed to the relevant person(s) promptly in the format required			
		5.2	make suitable and justifiable recommendations for cost effective repairs			
		5.3	record and report any additional faults noticed during the course of their work promptly in the format required			

Learner name: _____ Date: _____

Learner signature: _____ Date: _____

Assessor signature: _____ Date: _____

Internal verifier signature: _____ Date: _____
(if sampled)

Unit 38: Knowledge of Diagnosis and Rectification of Lift Truck Mechanical Handling and Chassis System Faults

Unit reference number: T/602/6432

QCF Level: 3

Credit value: 6

Guided learning hours: 45

Unit summary

This unit enables the learner to develop an understanding of diagnosis and rectification of mechanical handling, braking and steering systems. It also covers the evaluation of performance of the repaired system.

Assessment Requirements/Evidence requirements:

If this unit is offered within a competence qualification (VCQ) it must be assessed in accordance with the IMI Assessment Strategy (*Annexe C*).

This unit must adhere to the IMI Knowledge Unit Syllabus as set out below:

The construction and operation of lift truck mechanical handling and chassis systems to include:

- a. mast and carriage assemblies
- b. steering
- c. braking
- d. axle stability systems
- e. hydraulic systems

How to examine, measure and make suitable adjustments to the components including:

- a. settings
- b. input and output values
- c. voltages
- d. current consumption
- e. resistance

- f. output patterns with oscilloscope
- g. pressures
- h. condition
- i. wear and performance

Electrical and electronic principles of lift truck chassis systems

- a. the operation of electrical and electronic systems and components related to lift truck chassis systems including:
 - i. ECU
 - ii. sensors and actuators
 - iii. electrical inputs
 - iv. voltages
 - v. oscilloscope patterns
 - vi. digital and fibre optic principles
- b. the interaction between the electrical/electronic system and mechanical components of chassis systems
- c. electronic and electrical safety procedures

Operation of advanced lift truck braking systems

- a. layout of:
 - i. air over hydraulic
 - ii. full air braking
 - iii. anti-lock braking
 - iv. skid steer systems
 - v. warning systems
- b. The operation of:
 - i. compressors
 - ii. actuators
 - iii. load/speed sensors
 - iv. load sensors
 - v. hoses/pipelines
 - vi. cables and connectors
- c. advantage of air/air over hydraulic braking systems over conventional braking systems
- d. the relationship and interaction of ABS braking with and other lift truck systems – traction control

Steering systems for advanced lift truck applications

- a. the construction and operation of power assisted steering systems:
 - i. hydraulic system
 - ii. power cylinders
 - iii. drive belts and pumps
 - iv. hydraulic valve (rotary, spool and flapper type)

- b. the operation of:
 - i. electronic power steering systems (EPS)
 - ii. electrical and electronic components

Components and operation of mechanical handling systems

- a. the components, construction and operation of mechanical handling systems
 - i. hydraulics
 - ii. pumps
 - iii. valve blocks
 - iv. circuits
 - v. circuit diagrams
 - vi. pressures and flows
 - vii. filters
 - viii. rams – displacement and vented
 - ix. control systems
 - x. faults
 - xi. overload and safety precautions
 - xii. mechanical
 - xiii. mast types – duplex, triplex, full free, reach, boom/telescopic
 - xiv. mast design capacity and testing
 - xv. lift chain design, capacity and testing, to include wear and tolerances
 - xvi. fork design, capacity and testing, to include wear and tolerances
 - xvii. roll over protection systems (ROPS) – design and replacement
 - xviii. falling object protection systems (FOPS) – design and replacement
 - xix. attachments – design, fitting, stability, de-rating and inspection
- b. the operation of mechanical handling systems under various conditions:
 - i. smooth floor
 - ii. rough terrain

Operation of fitting different masts and attachments

- a. the reasons for fitting different masts and attachments
- b. the geometry and calculations associated with the above changes

Symptoms and faults in braking systems

- a. symptoms and faults associated with air over hydraulic and full air braking systems:
 - i. mechanical
 - ii. hydraulic
 - iii. electrical and electronic systems

- iv. fluid leaks
- v. warning light operation
- vi. poor brake efficiency
- vii. wheel locking under braking

Diagnose faults in braking systems

- a. locate and interpret information for:
 - i. diagnostic tests
 - ii. lift truck and equipment specifications
 - iii. use of equipment
 - iv. testing procedures
 - v. test plans
 - vi. fault codes
 - vii. legal requirements
- b. how to prepare equipment for use in diagnostic testing
- c. how to conduct systematic testing and inspection of:
 - i. braking system
 - ii. air over hydraulic
 - iii. full air braking
 - iv. mechanical
 - v. hydraulic
 - vi. electrical and electronic systems
- d. using appropriate tools and equipment including:
 - i. multi-meters
 - ii. oscilloscope
 - iii. pressure gauges
- e. evaluate and interpret test results from diagnostic testing
- f. compare test result and values with lift truck manufacturer's specifications and settings
- g. how to dismantle, components and systems using appropriate equipment and procedures
- h. assess, examine and evaluate the operation, settings, values, condition and performance of components and systems
- i. probable faults, malfunctions, incorrect settings
- j. rectification or replacement procedures
- k. evaluate operation of systems following diagnosis and repair to confirm operation and performance

Symptoms and causes of faults found in lift truck mechanical handling and chassis systems to include:

- a. mast and carriage assemblies
- b. steering
- c. braking

- d. axle stability systems
- e. hydraulic systems

Symptoms and faults associated with steering systems:

- a. mechanical
- b. hydraulic
- c. electrical and electronic
- d. steering boxes (rack and pinion, worm and re-circulating ball)
- e. steering arms and linkages
- f. steering joints and bushes
- g. idler gears
- h. bearings
- i. steering columns (collapsible and absorbing)
- j. power steering system

Diagnosis and faults in steering systems

- a. locate and interpret information for:
 - i. diagnostic tests
 - ii. lift truck and equipment specifications
 - iii. use of equipment
 - iv. testing procedures
 - v. test plans
 - vi. fault codes
 - vii. legal requirements
- b. how to prepare equipment for use in diagnostic testing
- c. conduct systematic testing and inspection of:
 - i. steering systems
 - ii. mechanical
 - iii. hydraulic
 - iv. electrical and electronic systems
 - v. power steering system
- d. using appropriate tools and equipment including:
 - i. multi-meters
 - ii. oscilloscope
 - iii. pressure gauges
 - iv. wheel alignment equipment
 - v. steering geometry equipment
- e. evaluate and interpret test results from diagnostic testing
- f. compare test result and values with lift truck manufacturer's specifications and settings
- g. how to dismantle, components and systems using appropriate equipment and procedures

- h. assess, examine and evaluate the:
 - i. operation
 - ii. settings
 - iii. values
 - iv. condition and performance of components and systems
- i. probable faults, malfunctions, and incorrect settings
- j. rectification or replacement procedures
- k. evaluate operation of systems following diagnosis and repair to confirm operation and performance

Symptoms and faults associated with mechanical handling systems:

- a. mechanical
- b. hydraulic
- c. electrical and electronic
- d. conventional
- e. wear
- f. noises under operation
- g. fluid leakage
- h. excessive travel
- i. excessive tyre wear

Diagnose faults in mechanical handling systems

- a. locate and interpret information for:
 - i. diagnostic tests
 - ii. lift truck and equipment specifications
 - iii. use of equipment
 - iv. testing procedures
 - v. test plans
 - vi. fault codes
 - vii. legal requirements
- b. how to prepare equipment for use in diagnostic testing
- c. how to conduct systematic testing and inspection of:
 - i. mechanical handling systems
 - ii. mechanical
 - iii. hydraulic
 - iv. electrical and electronic systems
 - v. conventional

- d. using appropriate tools and equipment including:
 - i. multi-meters
 - ii. oscilloscope
 - iii. pressure gauges
 - iv. alignment equipment
 - v. geometry equipment
 - vi. chain and fork gauges
- e. evaluate and interpret test results from diagnostic testing
- f. compare test result and values with lift truck manufacturer's specifications and settings
- g. how to dismantle, components and systems using appropriate equipment and procedures
- h. assess, examine and evaluate the operation, settings, values, condition and performance of components and systems
- i. probable faults, malfunctions and incorrect settings
- j. rectification or replacement procedures
- k. evaluate operation of systems following diagnosis and repair to confirm operation and performance

Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria			Evidence type	Portfolio reference	Date
1	Understand how the lift truck mechanical handling and chassis systems operate	1.1	identify lift truck mechanical handling and chassis system components				
		1.2	explain the construction and operation of lift truck mechanical handling and chassis systems				
		1.3	explain the interaction between electrical, electronic and mechanical components within lift truck mechanical handling and chassis systems				
		1.4	explain how lift truck mechanical handling and chassis electrical systems interlink and interact, including multiplexing				
		1.5	compare lift truck mechanical handling and chassis system components and assemblies against alternatives to identify differences in construction and operation				
		1.6	identify the engineering principles that are related to lift truck mechanical handling and chassis systems a. inertia force, mass and acceleration b. laws of friction c. static's d. hydraulic machines				

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
<p>2 Understand how to diagnose and rectify faults in lift truck mechanical handling and chassis systems</p>	2.1 analyse symptoms and causes of faults found in lift truck mechanical handling and chassis systems			
	2.2 explain systematic diagnostic techniques used in identifying lift truck mechanical handling and chassis system faults			
	2.3 explain how to examine, measure and make suitable adjustments to the components			
	2.4 explain how to carry out the diagnosis and rectification activities in order to correct the faults in the lift truck mechanical handling and chassis systems			
	2.5 explain how to select, prepare use diagnostic and rectification equipment for lift truck mechanical handling and chassis systems			
	2.6 explain how to evaluate and interpret test results found in diagnosing lift truck mechanical handling and chassis system faults against manufacturers' specifications and settings			
	2.7 state why rectification methods are justified when related to lift truck mechanical handling and chassis system faults			
	2.8 explain how to evaluate the operation of components and systems following diagnosis and repair to confirm system performance			

Learner name: _____
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Assessor signature: _____
Internal verifier signature: _____
(if sampled)

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Unit 39: Skills in Diagnosing and Rectifying Lift Truck Transmission and Driveline Faults

Unit reference number: A/602/6450

QCF Level: 3

Credit value: 5

Guided learning hours: 45

Unit Summary

This unit allows the learner to develop skills to diagnose and rectify lift truck gearboxes, hubs and bearings, driveline shafts, torque converters, differentials and final drive unit faults. It also covers the evaluation of performance of the replaced or repaired units and systems.

Assessment Requirements/Evidence requirements:

This unit must adhere to the IMI Skills Unit Assessment Requirements as set out below:

You must:

1. produce evidence to show you meet **all** of the Learning Outcomes
2. produce performance evidence resulting from work you have carried out in your training workshop as managed and organised by an approved centre
3. be observed by an assessor as defined by the IMI Assessment Strategy
4. be observed by an assessor diagnosing and rectifying **2 different** faults in the transmission and driveline systems listed. The fault should involve a **2 or more** step diagnostic activity:
 - powershift unit
 - hubs and bearings
 - driveline shafts
 - torque converter

Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
1	Be able to work safely when carrying out lift truck transmission and driveline diagnostic and rectification activities	1.1	wear suitable personal protective equipment and coverings when carrying out lift truck diagnostic and rectification activities			
		1.2	work in a way that minimises the risk of damage or injury to the lift truck, people or 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 diagnostic and rectification activities including: a. technical data b. diagnostic test procedures			
		2.2	use sufficient diagnostic information in a systematic way to enable an accurate diagnosis of lift truck transmission and driveline system faults			
3	Be able to use appropriate tools and equipment	3.1	select the appropriate tools and equipment necessary for diagnostic and rectification activities			
		3.2	check that equipment has been calibrated to meet manufacturers' and legal requirements			
		3.3	use the equipment required, correctly and safely throughout all lift truck transmission and driveline diagnostic and rectification activities			

Learning outcomes		Assessment criteria			Evidence type	Portfolio reference	Date
4	Be able to carry out lift truck transmission and driveline diagnosis, rectification and test activities	4.1	use diagnostic methods that are relevant to the symptoms presented				
		4.2	evaluate your assessment of dismantled sub-assemblies and identify their condition and suitability for repair or replacement accurately				
		4.3	carry out all diagnostic and rectification activities following: a. manufacturers' instructions b. recognised researched repair methods c. workplace procedures d. health and safety requirements				
		4.4	ensure all repaired and replaced components and units conform to the operating specification and any legal requirements				
		4.5	adjust components and units correctly to ensure that they operate to meet system requirements				
		4.6	use testing methods that are suitable for assessing the performance of the system rectified				

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
5	Be able to record information and make suitable recommendations	5.1	produce work records that are accurate, complete and passed to the relevant person(s) promptly in the format required			
		5.2	make suitable and justifiable recommendations for cost effective repairs			
		5.3	record and report any additional faults noticed during the course of their work promptly in the format required			

Learner name: _____ Date: _____
Learner signature: _____ Date: _____
Assessor signature: _____ Date: _____
Internal verifier signature: _____ Date: _____
(if sampled)

Unit 40: Knowledge of Diagnosis and Rectification of Lift Truck Transmission and Driveline System Faults

Unit reference number: L/602/6436

QCF Level: 3

Credit value: 6

Guided learning hours: 45

Unit Summary

This unit enables the learner to develop an understanding of diagnosis and rectification of lift truck gearboxes, hubs and bearings, driveline shafts, torque converters, differentials and final drive units. It also covers the evaluation of performance of the systems.

Assessment Requirements/Evidence requirements:

If this unit is offered within a competence qualification (VCQ) it must be assessed in accordance with the IMI Assessment Strategy (*Annexe C*).

This unit must adhere to the IMI Knowledge Unit Syllabus as set out below:

The construction and operation of lift truck transmission and driveline systems to include:

- a. gearboxes
- b. hubs and bearings
- c. driveline shafts
- d. torque converter
- e. final drive assembly

How to examine, measure and make suitable adjustments components including:

- a. settings
- b. input and output values
- c. voltages
- d. current consumption
- e. resistance

- f. output patterns with oscilloscope
- g. pressures
- h. condition
- i. wear and performance

Electrical and electronic principles related to lift truck transmission systems

- a. the operation of electrical and electronic systems and components related to lift truck transmission systems including:
 - i. ECU
 - ii. sensors and actuators
 - iii. electrical inputs & outputs
 - iv. voltages
 - v. oscilloscope patterns
 - vi. digital and fibre optic principles
- b. the interaction between the electrical/electronic system, hydraulic system and mechanical components of the transmission systems
- c. electronic and electrical safety procedures

Operation of lift truck fluid couplings and torque converters

- a. the construction and operation of clutch packs
- b. the construction and operation of fluid couplings including:
 - i. fluid flywheel
 - ii. torque converter (torque multiplication, efficiency)
 - iii. benefits of fluid couplings
 - iv. benefits of torque converter over fluid flywheel

Operation of lift truck transmissions and driveline systems

- a. the construction and operation of power shift transmissions:
 - i. torque converters
 - ii. gear arrangements
 - iii. shaft and bearing arrangements
 - iv. inching mechanisms
 - v. linkages
 - vi. lubrication
- b. the construction and operation of automatic gearboxes including hydraulic and electronic control systems: operations of epicyclic gears (sun, planet, annulus and carrier), method for achieving different gear ratios using epicyclic gearing; hydraulic control systems, components and operation; electronic control system, components and operation
- c. the construction and operation of skid steer transmissions and the benefits of this type of gearbox design

- d. the construction and operation of full hydraulic transmissions
- e. the construction and operation of final drive systems including:
 - i. conventional crown wheel and pinion
 - ii. differential gears
 - iii. limited slip differential
- f. the construction and operation of lift truck hub arrangements
- g. the construction and operation of:
 - i. drive shafts
 - ii. prop shafts including flexible joints and couplings
 - iii. universal joints
 - iv. constant velocity joints
 - v. sliding joints
- h. the construction and operation of SCR, MOSFET and AC controlled traction systems
 - i. SCR
 - ii. MOSFET
 - iii. AC
 - iv. canbus

Common symptoms and faults lift truck transmissions and driveline systems

- a. torque converter and coupling faults:
 - i. abnormal noises
 - ii. vibrations
 - iii. fluid leaks
 - iv. slipping stator
 - v. seized stator
- b. transmission faults:
 - i. abnormal noises
 - ii. vibrations
 - iii. loss of drive
 - iv. overheating
 - v. failure to engage gear
 - vi. failure to disengage gear
 - vii. leaks
 - viii. failure to operate
 - ix. incorrect shift patterns
 - x. electrical and electronic faults

- c. final drive faults:
 - i. abnormal noises
 - ii. vibrations
 - iii. loss of drive
 - iv. oil leaks
 - v. failure to operate
 - vi. electrical and electronic faults
- d. drivelines and couplings:
 - i. abnormal noises
 - ii. vibrations
 - iii. loss of drive
- e. traction faults:
 - i. loss of drive
 - ii. low speed
 - iii. fails safe
 - iv. creep
 - v. electronic braking faults

Diagnose faults in lift truck transmission systems

- a. locate and interpret information for:
 - i. diagnostic tests
 - ii. lift truck and equipment specifications
 - iii. use of equipment
 - iv. testing procedures
 - v. test plans
 - vi. fault codes
 - vii. legal requirements
- b. how to prepare equipment for use in diagnostic testing
- c. how to conduct systematic testing and inspection of transmission system, mechanical, hydraulic, electrical and electronic systems using appropriate tools and equipment including, multi-meters, oscilloscope, pressure gauges
- d. how to carry out workshop based and testing of lift truck and transmission system
- e. evaluate and interpret test results from diagnostic and/or road testing
- f. compare test result and values with lift truck manufacturer's specifications and settings
- g. how to dismantle, components and systems using appropriate equipment and procedures
- h. assess, examine and evaluate the operation, settings, values, condition and performance of components and systems

- i. probable faults, malfunctions and incorrect settings
- j. rectification or replacement procedures
- k. evaluate operation of systems following diagnosis and repair to confirm operation and performance

Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria			Evidence type	Portfolio reference	Date
1	Understand how the lift truck transmission and driveline systems operate	1.1	identify lift truck transmission and driveline system components				
		1.2	explain the construction and operation of lift truck transmission and driveline systems				
		1.3	explain the interaction between electrical, electronic and mechanical components within lift truck transmission and driveline systems				
		1.4	explain how electrical systems interlink and interact, including multiplexing				
		1.5	compare lift truck transmission and driveline system components and assemblies against alternatives to identify differences in construction and operation				
		1.6	identify the engineering principles that are related to lift truck transmission and driveline systems <ul style="list-style-type: none"> a. friction b. torque transmission c. materials d. fluids & energy e. potential & kinetic energy 				

Learning outcomes		Assessment criteria			Evidence type	Portfolio reference	Date
2	Understand how to diagnose and rectify faults in lift truck transmission and driveline systems	2.1	analyse symptoms and causes of faults found in lift truck transmission and driveline systems				
		2.2	explain systematic diagnostic techniques used in identifying transmission and driveline system faults				
		2.3	explain how to examine, measure and make suitable adjustments components				
		2.4	explain how to carry out the rectification activities in order to correct the faults in the lift truck transmission and driveline systems				
		2.5	explain how to select, prepare and use diagnostic and rectification equipment for lift truck transmission and driveline systems				
		2.6	explain how to evaluate and interpret test results found in diagnosing lift truck transmission and driveline system faults against manufacturer specifications and settings				
		2.7	state why rectification methods are justified when related to lift truck transmission and driveline system faults				
		2.8	explain how to evaluate the operation of components and systems following diagnosis and repair to confirm system performance				

Learner name: _____
Learner signature: _____
Assessor signature: _____
Internal verifier signature: _____
(if sampled)

Date: _____
Date: _____
Date: _____
Date: _____

Unit 41: Competency in Making Learning Possible through Demonstrations and Instruction

Unit reference number: Y/601/6380

QCF Level: 3

Credit value: 5

Guided learning hours: 40

Unit summary

This unit will help the learner to develop competency in order to carry out demonstrations and instruction which will help the learner to learn. It includes demonstrating equipment, showing skills, giving instruction, deciding when to use demonstration or instruction, potential of technology based learning, checking on learners' progress and giving feedback.

Assessment Requirements/Evidence requirements:

This unit must be assessed in accordance with the IMI Assessment Strategy (*Annexe C*) and adhere to the IMI Competency Unit Assessment Requirements as set out below:

You must:

1. produce evidence to show you meet **all** of the Learning Outcomes
2. produce performance evidence resulting from work you have carried out in your normal workplace or as defined within the IMI VCQ Assessment Strategy as managed and organised by an approved centre when naturally occurring performance evidence does not occur at frequent intervals in your normal workplace or when safety is at risk
3. be observed by an assessor as defined in the IMI VCQ Assessment Strategy **or** by a witness who has been previously agreed with the assessor prior to the observation taking place
4. provide at least **1 record** of an activity which has been demonstrated
5. provide records of at least **2 observations, 1** of which **must be** by your assessor, which cover at least **1 demonstration** and **1 instruction or a combination of both**

It is expected that the **records** must include evidence to show how you:

- decided on the sequence of the demonstration
- ensured that the demonstration was accurate and realistic
- identified which learning outcomes were achieved
- ensured a safe environment for the demonstration and allowed all learners to see the demonstration clearly

In preparing the records you should consider:

- which types of learning are best achieved and supported through demonstrations
- how to choose between instruction and demonstration as learning methods
- how to identify individual learning needs
- which factors are likely to prevent learning and how to overcome them
- how to choose and prepare appropriate materials, including technology- based materials.
- which types of learning are best achieved through instruction
- how to make sure everybody acts in line with health, safety and environmental protection legislation and best practice
- how to analyse developments in learning and new ways of delivery, including technology-based learning

It is also expected that evidence from your observations **will show** how you:

- structured the demonstration so that the learner got the most out of it
- encouraged learners to ask questions and get explanations at appropriate stages in the demonstration
- gave learners the opportunities to practise the skill being demonstrated
- gave learners positive feedback
- reinforced learning by repeating demonstration
- responded to the needs of learners during the demonstration
- reduced distractions and disruptions as much as possible
- matched instruction to the needs of learners
- ensured that the manner, level and speed of the instruction encourages learners to take part
- regularly check that learners understand and adapt instruction as appropriate
- gave learners positive feedback on the learning experience and the outcome achieved
- identified anything that prevented learning and reviewed this with the learner

Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
1	Be able to demonstrate skills and methods to learners	1.1	perform demonstrations based on an analysis of the skills needed and the order in which they must be learned			
		1.2	perform demonstrations that are accurate and realistic			
		1.3	perform structured demonstrations so that the learner can get the most out of it			
		1.4	perform demonstrations whilst encouraging learners to ask questions and get explanation at appropriate stages in the demonstration			
		1.5	provide positive feedback to learners whilst they are being given the opportunity to practise the skills that have been demonstrated			
		1.6	perform additional demonstrations of skills being taught to reinforce learning			
		1.7	perform demonstrations in a safe environment which also allows learners to see clearly			
		1.8	respond to the needs of the learners during demonstrations			
		1.9	reduce distractions and disruptions as much as possible			

Learning outcomes		Assessment criteria			Evidence type	Portfolio reference	Date
2	Be able to instruct learners	2.1	implement instruction which is matched to the needs of learners				
		2.2	use identified learning outcomes which can be achieved through instruction				
		2.3	perform instruction, ensuring that the manner, level and speed of the instruction encourages learners to take part				
		2.4	perform instruction whilst regularly checking that the learners understand and adapt instruction as appropriate				
		2.5	give learners positive feedback on the learning experience and the outcomes achieved				
		2.6	carry out a review with the learners to identify anything that prevented learning and adapt instruction as appropriate				

Learner name: _____ Date: _____

Learner signature: _____ Date: _____

Assessor signature: _____ Date: _____

Internal verifier signature: _____ Date: _____
(if sampled)

Unit 42: Competency in Diagnosing and Rectifying Lift Truck Power Plant Engine Unit Faults

Unit reference number: F/602/6420

QCF Level: 3

Credit value: 10

Guided learning hours: 90

Unit summary

This unit allows the learner to develop skills to diagnose and rectify lift truck power plant mechanical, electrical, hydraulic and fluid system faults. It also covers the evaluation of performance of the replaced or repaired units and systems.

Assessment Requirements/Evidence requirements:

This unit must be assessed in accordance with the IMI Assessment Strategy (*Annexe C*) and adhere to the IMI Competency Unit Assessment Requirements as set out below:

You must:

1. produce evidence to show you meet **all** of the Learning Outcomes
2. produce performance evidence resulting from work you have carried out on real vehicles in your normal workplace or as defined within the IMI VCQ Assessment Strategy as managed and organised by an approved centre when naturally occurring performance evidence does not occur at frequent intervals in your normal workplace or when safety is at risk
3. be observed by an assessor as defined in the IMI VCQ Assessment Strategy
4. produce evidence of diagnosing and rectifying faults occurring in **each** of the **engine** systems listed, **at least 2** of which must come from work carried out **in your normal workplace:**
 - engine mechanical system
 - engine electrical and electronic systems
 - engine hydraulic and fluid systems

5. be observed by your assessor on **at least 1 occasion**. The fault should involve a **2 or more** step diagnostic activity. The observation must be carried out **in your normal workplace**

Simulated activity **will be** acceptable to assess candidates' competence in diagnosis and rectification on no more than **1** occasion

Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
1	Be able to work safely when carrying out lift truck power plant unit diagnostic and rectification activities	1.1	wear suitable personal protective equipment and coverings when carrying out lift truck diagnostic and rectification 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 diagnostic and rectification activities including:			
			a. technical data			
		b. diagnostic test procedures				
		2.2	interpret technical information to support lift truck diagnostic and rectification activities			
		2.3	use sufficient diagnostic information in a systematic way to enable an accurate diagnosis of lift truck power plant system faults			
3	Be able to use appropriate tools and equipment	3.1	select the appropriate tools and equipment necessary for diagnostic and rectification activities			
		3.2	check that equipment has been calibrated to meet manufacturers' and legal requirements			
		3.3	use the equipment required, correctly and safely throughout all lift truck power plant diagnostic and rectification activities			

Learning outcomes		Assessment criteria			Evidence type	Portfolio reference	Date
4	Be able to carry out lift truck power plant diagnosis, rectification and test activities	4.1	use diagnostic methods that are relevant to the symptoms presented				
		4.2	evaluate your assessment of dismantled sub-assemblies and identify their condition and suitability for repair or replacement accurately				
		4.3	carry out all diagnostic and rectification activities following: a. manufacturers' instructions b. recognised researched repair methods c. workplace procedures d. health and safety requirements				
		4.4	ensure all repaired and replaced components and units conform to the operating specification and any legal requirements				
		4.5	adjust components and units correctly to ensure that they operate to meet system requirements				
		4.6	ensure testing methods are suitable for assessing the performance of the system rectified				
		4.7	complete all system diagnostic activities within the agreed timescale				

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
5	Be able to record information and make suitable recommendations	5.1	produce work records that are accurate, complete and passed to the relevant person(s) promptly in the format required			
		5.2	make suitable and justifiable recommendations for cost effective repairs			
		5.3	identify and report any expected delays in completion to the relevant person(s) promptly in the format required			
		5.4	record and report any additional faults noticed during the course of their work promptly in the format required			

Learner name: _____ Date: _____
Learner signature: _____ Date: _____
Assessor signature: _____ Date: _____
Internal verifier signature: _____ Date: _____
(if sampled)

Unit 43: Competency in Diagnosing and Rectifying Lift Truck Mechanical Handling and Chassis System Faults

Unit reference number: J/602/6421

QCF Level: 3

Credit value: 10

Guided learning hours: 90

Unit summary

This unit allows the learner to develop skills to diagnose and rectify lift truck mechanical handling, braking and steering systems faults. It also covers the evaluation of performance of the replaced or repaired units and systems.

Assessment Requirements/Evidence requirements:

This unit must be assessed in accordance with the IMI Assessment Strategy (*Annexe C*) and adhere to the IMI Competency Unit Assessment Requirements as set out below:

You must:

1. produce evidence to show you meet **all** of the Learning Outcomes
2. produce performance evidence resulting from work you have carried out on real vehicles in your normal workplace or as defined within the IMI VCQ Assessment Strategy as managed and organised by an approved centre when naturally occurring performance evidence does not occur at frequent intervals in your normal workplace or when safety is at risk
3. be observed by an assessor as defined in the IMI VCQ Assessment Strategy
4. produce evidence of diagnosing and rectifying at least **1** fault from **each** system listed. The fault should involve a **2 or more** step diagnostic activity. **At least 2** pieces of evidence must come from work carried out **in your normal workplace:**
 - mechanical handling systems
 - steering system
 - braking system

5. be observed by your assessor on **at least 1 occasion**, covering the diagnosis and rectification of a fault in the chassis systems

Simulated activity **will be** acceptable to assess candidates' competence in diagnosis and rectification on no more than **1** occasion

Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
1	Be able to work safely when carrying out lift truck mechanical handling and chassis diagnostic and rectification activities	1.1	wear suitable personal protective equipment and coverings when carrying out lift truck diagnostic and rectification 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 diagnostic and rectification activities including:			
			a. technical data b. diagnostic test procedures			
3	Be able to use appropriate tools and equipment	2.2	use sufficient diagnostic information in a systematic way to enable an accurate diagnosis of lift truck mechanical handling and chassis system faults			
		3.1	select the appropriate tools and equipment necessary for diagnostic and rectification activities			
			3.2	check that equipment has been calibrated to meet manufacturers' and legal requirements		
		3.3	use the equipment required, correctly and safely throughout all lift truck mechanical handling and chassis system diagnostic and rectification activities			

Learning outcomes		Assessment criteria			Evidence type	Portfolio reference	Date
4	Be able to carry out lift truck mechanical handling and chassis diagnosis, rectification and test activities	4.1	use diagnostic methods that are relevant to the symptoms presented				
		4.2	evaluate your assessment of dismantled sub-assemblies and identify their condition and suitability for repair or replacement accurately				
		4.3	carry out all diagnostic and rectification activities following: a. manufacturers' instructions b. recognised researched repair methods c. workplace procedures d. health and safety requirements				
		4.4	ensure all repaired and replaced components and units conform to the vehicle operating specification and any legal requirements				
		4.5	adjust components and units correctly to ensure that they operate to meet system requirements				
		4.6	demonstrate testing methods that are suitable for assessing the performance of the system rectified				

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
5	Be able to record information and make suitable recommendations	5.1	produce work records that are accurate, complete and passed to the relevant person(s) promptly in the format required			
		5.2	make suitable and justifiable recommendations for cost effective repairs			
		5.3	record and report any additional faults noticed during the course of their work promptly in the format required			

Learner name: _____ Date: _____

Learner signature: _____ Date: _____

Assessor signature: _____ Date: _____

Internal verifier signature: _____ Date: _____
(if sampled)

Unit 44: Competency in Inspecting Lift Trucks to Comply with Legal Requirements

Unit reference number: L/602/6419

QCF Level: 3

Credit value: 4

Guided learning hours: 30

Unit summary

This unit allows the learner to demonstrate they can carry out a range of lift truck legal compliance inspections using a variety of methods.

Assessment Requirements/Evidence requirements:

This unit must be assessed in accordance with the IMI Assessment Strategy (*Annexe C*) and adhere to the IMI Competency Unit Assessment Requirements as set out below:

You must:

1. produce evidence to show you meet **all** of the Learning Outcomes
2. produce performance evidence resulting from work you have carried out on real vehicles in your normal workplace or as defined within the IMI VCQ Assessment Strategy as managed and organised by an approved centre when naturally occurring performance evidence does not occur at frequent intervals in your normal workplace or when safety is at risk
3. be observed by an assessor as defined in the IMI VCQ Assessment Strategy
4. produce evidence of carrying out **4 different** lift truck inspections. Evidence must include **at least 2*** of the following types of inspection:
 - pre-delivery and pre purchase
 - thorough examination
 - thorough examination and test
 - LOLER
 - pre and post hire

5. be observed by your assessor **in your normal workplace** carrying out an inspection on **at least 1 occasion**

*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 inspections listed above

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

Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
1	Be able to work safely when carrying out lift truck inspections	1.1	use suitable personal protective equipment and coverings when carrying out lift truck inspections to comply with legal requirements			
		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: <ul style="list-style-type: none"> a. lift truck technical data b. inspection procedures c. legal requirements d. lift truck inspection manual 			
		2.2	use 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	ensure that equipment has been calibrated to meet manufacturers' and legal requirements			
		3.3	use the tools and equipment in the way specified by manufacturers when carrying out a range of inspections on lift truck systems			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
4	Be able to carry out lift truck inspections	4.1	<p>carry out lift truck inspections, adhering to the specifications and tolerances and following:</p> <ul style="list-style-type: none"> a. manufacturer's approved inspection methods b. recognised researched inspection methods c. health and safety requirements d. workplace procedures 			
		4.2	ensure the inspected lift truck complies to the operating specification and any legal requirements			
		4.3	<p>ensure any comparison of the lift truck against specification accurately identifies any:</p> <ul style="list-style-type: none"> 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			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
5	Be able to record information and make suitable recommendations	5.1	produce work records that are accurate, complete and passed to the relevant person(s) promptly in the format required			
		5.2	make suitable and justifiable recommendations for future action based on the inspection			
		5.3	identify and report any expected delays in completion to the relevant person(s) promptly in the format required			
		5.4	record and report any additional faults noticed during the course of their work promptly in the format required			

Learner name: _____ Date: _____
Learner signature: _____ Date: _____
Assessor signature: _____ Date: _____
Internal verifier signature: _____ Date: _____
(if sampled)

Unit 45: Competency in Diagnosing and Rectifying Lift Truck Electrical Units and Component Faults

Unit reference number: Y/602/6410

QCF Level: 3

Credit value: 10

Guided learning hours: 90

Unit summary

This unit will help the learner to develop the skills required to demonstrate they can diagnose and rectify lift truck electrical system faults. It also covers the evaluation of performance of the replaced or repaired units and systems.

Assessment Requirements/Evidence requirements:

This unit must be assessed in accordance with the IMI Assessment Strategy (*Annexe C*) and adhere to the IMI Competency Unit Assessment Requirements as set out below:

You must:

1. produce evidence to show you meet all of the Learning Outcomes
2. produce performance evidence resulting from work you have carried out on real vehicles in your normal workplace or as defined within the IMI VCQ Assessment Strategy as managed and organised by an approved centre when naturally occurring performance evidence does not occur at frequent intervals in your normal workplace or when safety is at risk
3. be observed by an assessor as defined in the IMI VCQ Assessment Strategy
4. produce evidence of carrying out diagnosis and rectification activities from **4 different systems out of the 13 listed below** *. One of which must be alternator or a starter motor. The fault should involve a **2 or more** step diagnostic activity. **At least 3** pieces of evidence must come from work carried out **in your normal workplace**:
 - lighting systems
 - wiper systems
 - accelerator systems
 - warning devices
 - direction control systems

- hydraulic auxiliary systems
 - speed governing systems
 - starting systems
 - charging systems
 - traction control systems
 - electric drive, hydraulic and steering motors
 - traction battery and charger
 - monitoring and instrumentation systems
5. be observed by your assessor on **at least 1 occasion**, covering the diagnosis and rectification of a fault

*However, you must prove to your assessor that you have the necessary knowledge and understanding to be able to perform competently in respect of faults occurring in all the types of electrical systems

Simulated activity **will be** acceptable to assess candidates' competence in diagnosis and rectification on no more than **1** occasion

Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
1	Be able to work safely when carrying out lift truck electrical diagnostic and rectification activities	1.1	wear suitable personal protective equipment and coverings when carrying out lift truck diagnostic and rectification activities			
		1.2	work in a way that minimises the risk of damage or injury to the lift truck, people or environment			
2	Be able to use relevant information to carry out the task	2.1	select suitable sources of technical information to support the lift truck diagnostic and rectification activities including: a. technical data b. diagnostic test procedures			
		2.2	use sufficient diagnostic information in a systematic way to enable an accurate diagnosis of lift truck electrical system faults			
3	Be able to use appropriate tools and equipment	3.1	select the appropriate tools and equipment necessary for diagnostic and rectification activities			
		3.2	ensure that equipment has been calibrated to meet manufacturers' and legal requirements			
		3.3	use the equipment required, correctly and safely throughout all lift truck electrical diagnostic and rectification activities			

Learning outcomes		Assessment criteria			Evidence type	Portfolio reference	Date
4	Be able to carry out lift truck diagnosis, rectification and test activities	4.1	use diagnostic methods that are relevant to the symptoms presented				
		4.2	evaluate your assessment of dismantled sub-assemblies and identify their condition and suitability for repair or replacement accurately				
		4.3	carry out all diagnostic and rectification activities following: a. manufacturers' instructions b. recognised researched repair methods c. workplace procedures d. health and safety requirements				
		4.4	ensure all repaired and replaced components and units conform to the operating specification and any legal requirements				
		4.5	adjust components and units correctly to ensure that they operate to meet system requirements				
		4.6	use testing methods that are suitable for assessing the performance of the system rectified				
		4.7	complete all system diagnostic activities within the agreed timescale				

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
5	Be able to record information and make suitable recommendations	5.1	inform the relevant person(s) promptly where repairs are uneconomic or unsatisfactory to perform			
		5.2	record and report any additional faults you notice during the course of work promptly			
		5.3	ensure your records are accurate, complete and passed to the relevant person(s) promptly in the format required			
		5.4	report any anticipated delays in completion to the relevant person(s) promptly			

Learner name: _____ Date: _____
Learner signature: _____ Date: _____
Assessor signature: _____ Date: _____
Internal verifier signature: _____ Date: _____
(if sampled)

Unit 46: Competency in Diagnosing and Rectifying Lift Truck Transmission and Driveline Faults

Unit reference number: R/602/6423

QCF Level: 3

Credit value: 10

Guided learning hours: 90

Unit summary

This unit allows the learner to develop skills to diagnose and rectify lift truck gearboxes, hubs and bearings, driveline shafts, torque converters, differentials and final drive unit faults. It also covers the evaluation of performance of the replaced or repaired units and systems.

Assessment Requirements/Evidence requirements:

This unit must be assessed in accordance with the IMI Assessment Strategy (*Annexe C*) and adhere to the IMI Competency Unit Assessment Requirements as set out below:

You must:

1. produce evidence to show you meet **all** of the Learning Outcomes
2. produce performance evidence resulting from work you have carried out on real vehicles in your normal workplace or as defined within the IMI VCQ Assessment Strategy as managed and organised by an approved centre when naturally occurring performance evidence does not occur at frequent intervals in your normal workplace or when safety is at risk
3. be observed by an assessor as defined in the IMI VCQ Assessment Strategy
4. produce evidence of diagnosing and rectifying 1 fault in each of the transmission and driveline systems listed. The fault should involve a **2 or more** step diagnostic activity. **At least 3** pieces of evidence must come from work carried out **in your normal workplace:**
 - powershift unit
 - hubs and bearings
 - driveline shafts
 - torque converter

5. be observed by your assessor on **at least 1 occasion** carrying out the diagnosis and rectification of a fault in a transmission or driveline system

Simulated activity **will be** acceptable to assess candidates' competence in diagnosis and rectification on no more than **1** occasion

Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
1	Be able to work safely when carrying out lift truck transmission and driveline diagnostic and rectification activities	1.1	wear suitable personal protective equipment and coverings when carrying out lift truck diagnostic and rectification activities			
		1.2	work in a way that minimises the risk of damage or injury to the lift truck, people or 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 diagnostic and rectification activities including: a. technical data b. diagnostic test procedures			
		2.2	use sufficient diagnostic information in a systematic way to enable an accurate diagnosis of lift truck transmission and driveline system faults			
3	Be able to use appropriate tools and equipment	3.1	select the appropriate tools and equipment necessary for diagnostic and rectification activities			
		3.2	check that equipment has been calibrated to meet manufacturers' and legal requirements			
		3.3	use the equipment required, correctly and safely throughout all lift truck transmission and driveline diagnostic and rectification activities			

Learning outcomes		Assessment criteria			Evidence type	Portfolio reference	Date
4	Be able to carry out lift truck transmission and driveline diagnosis, rectification and test activities	4.1	use diagnostic methods that are relevant to the symptoms presented				
		4.2	evaluate your assessment of dismantled sub-assemblies and identify their condition and suitability for repair or replacement accurately				
		4.3	carry out all diagnostic and rectification activities following: a. manufacturers' instructions b. recognised researched repair methods c. workplace procedures d. health and safety requirements				
		4.4	ensure all repaired and replaced components and units conform to the operating specification and any legal requirements				
		4.5	adjust components and units correctly to ensure that they operate to meet system requirements				
		4.6	use testing methods that are suitable for assessing the performance of the system rectified				
		4.7	complete all system diagnostic activities within the agreed timescale				

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
5	Be able to record information and make suitable recommendations	5.1	produce work records that are accurate, complete and passed to the relevant person(s) promptly in the format required			
		5.2	make suitable and justifiable recommendations for cost effective repairs			
		5.3	identify and report any expected delays in completion to the relevant person(s) promptly in the format required			
		5.4	record and report any additional faults noticed during the course of their work promptly in the format required			

Learner name: _____ Date: _____

Learner signature: _____ Date: _____

Assessor signature: _____ Date: _____

Internal verifier signature: _____ Date: _____
(if sampled)

Unit 47: Skills in Inspecting Lift Trucks to Comply with Legal Requirements

Unit reference number: M/602/6445

QCF Level: 3

Credit value: 4

Guided learning hours: 30

Unit Summary

This unit allows the learner to demonstrate they can carry out a range of lift truck legal compliance inspections using a variety of methods.

Assessment Requirements/Evidence requirements:

This unit must adhere to the IMI Skills Unit Assessment Requirements as set out below:

You must:

1. produce evidence to show you meet all of the Learning Outcomes
2. produce performance evidence resulting from work you have carried out in your training workshop as managed and organised by an approved centre.
3. be observed by an assessor as defined by the IMI Assessment Strategy.
4. be observed by an assessor carrying out 2 different lift truck inspections.
 - pre-delivery and pre purchase
 - thorough examination
 - thorough examination and test
 - LOLER
 - pre and post hire

Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
1	Be able to work safely when carrying out lift truck inspections	1.1	Use suitable personal protective equipment and coverings when carrying out lift truck inspections to comply with legal requirements			
		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: <ul style="list-style-type: none"> a. lift truck technical data b. inspection procedures c. legal requirements d. lift truck inspection manual 			
		2.2	use 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	ensure that equipment has been calibrated to meet manufacturers' and legal requirements			
		3.3	use the tools and equipment in the way specified by manufacturers when carrying out a range of inspections on lift truck systems			

Learning outcomes	Assessment criteria		Evidence type	Portfolio reference	Date
4 Be able to carry out lift truck inspections	4.1	carry out lift truck inspections, adhering to the specifications and tolerances and following: a. manufacturer's approved inspection methods b. recognised researched inspection methods c. health and safety requirements d. workplace procedures			
	4.2	ensure the inspected lift truck complies 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			
5 Be able to record information and make suitable recommendations	5.1	produce work records that are accurate, complete and passed to the relevant person(s) promptly in the format required			
	5.2	make suitable and justifiable recommendations for future action based on the inspection			
	5.3	record and report any additional faults noticed during the course of their work promptly in the format required			

Learner name: _____
Learner signature: _____
Assessor signature: _____
Internal verifier signature: _____
(if sampled)

Date: _____
Date: _____
Date: _____
Date: _____

Further information

Our customer service numbers are:

BTEC and NVQ	0844 576 0026
GCSE	0844 576 0027
GCE	0844 576 0025
The Diploma	0844 576 0028
DiDA and other qualifications	0844 576 0031

Calls may be recorded for training purposes.

Useful publications

Related information and publications include:

- *Centre Handbook for Edexcel QCF NVQs and Competence-based Qualifications* published annually
- Functional Skills publications – specifications, tutor support materials and question papers
- *Regulatory Arrangements for the Qualification and Credit Framework* (published by Ofqual, August 2008)
- the current Edexcel publications catalogue and update catalogue.

Edexcel publications concerning the Quality Assurance System and the internal and standards verification of vocationally related programmes can be found on the Edexcel website.

NB: Some of our publications are priced. There is also a charge for postage and packing. Please check the cost when you order.

How to obtain National Occupational Standards

To obtain the National Occupational Standards go to www.ukstandards.org.uk.

Professional development and training

Edexcel supports UK and international customers with training related to NVQ and BTEC qualifications. This support is available through a choice of training options offered in our published training directory or through customised training at your centre.

The support we offer focuses on a range of issues including:

- planning for the delivery of a new programme
- planning for assessment and grading
- developing effective assignments
- building your team and teamwork skills
- developing student-centred learning and teaching approaches
- building Functional Skills into your programme
- building effective and efficient quality assurance systems.

The national programme of training we offer can be viewed on our website (www.edexcel.com/training). You can request customised training through the website or by contacting one of our advisers in the Training from Edexcel team via Customer Services to discuss your training needs.

The training we provide:

- is active
- is designed to be supportive and thought provoking
- builds on best practice
- may be suitable for those seeking evidence for their continuing professional development.

Annexe A: Progression pathways

The Edexcel qualification framework for the automotive sector

Level	BTEC vocationally-related qualifications	BTEC specialist qualification / professional	NVQ/competence
5	BTEC Level 5 HND Diploma in Vehicle Operations Management (QCF)		
4	BTEC Level 4 HNC Diploma in Vehicle Operations Management (QCF)		
3		<p>Edexcel BTEC Level 3 Diploma in Light Vehicle Maintenance and Repair Principles (QCF)</p> <p>Edexcel BTEC Level 3 Diploma in Heavy Vehicle Maintenance and Repair Principles (QCF)</p> <p>Edexcel BTEC Level 3 Diploma in Auto Electrical and Mobile Electrical Principles (QCF)</p> <p>Edexcel BTEC Level 3 Diploma in Vehicle Fitting Supervisory Principles (QCF)</p> <p>Edexcel BTEC Level 3 Diploma in Vehicle Accident Repair Body Principles (QCF)</p> <p>Edexcel BTEC Level 3 Diploma in Vehicle Accident Repair Paint Principles (QCF)</p>	<p>Edexcel Level 3 Diploma in Light Vehicle Maintenance and Repair Competence (QCF)</p> <p>Edexcel Level 3 Diploma in Heavy Vehicle Maintenance and Repair Competence(QCF)</p> <p>Edexcel Level 3 Diploma in Auto Electrical and Mobile Electrical Competence (QCF)</p> <p>Edexcel Level 3 Diploma in Vehicle Fitting Supervisory Competence (QCF)</p> <p>Edexcel Level 3 Diploma in Vehicle Accident Repair Body Competence (QCF)</p> <p>Edexcel Level 3 Diploma in Vehicle Accident Repair Paint Competence (QCF)</p>

Level	BTEC vocationally-related qualifications	BTEC specialist qualification / professional	NVQ/competence
3		<p>Edexcel BTEC Level 3 Diploma in Lift Truck Maintenance & Repair Principles (QCF)</p> <p>Edexcel BTEC Level 3 Diploma in Motorcycle Maintenance and Repair Principles (QCF)</p> <p>Edexcel BTEC Level 3 Diploma in Vehicle Sales Principles (QCF)</p> <p>Edexcel BTEC Level 3 Diploma in Body Building Principles (QCF)</p>	<p>Edexcel Level 3 Diploma in Lift Truck Maintenance & Repair Competence (QCF)</p> <p>Edexcel Level 3 Diploma in Motorcycle Maintenance and Repair Competence (QCF)</p> <p>Edexcel Level 3 Diploma in Vehicle Sales Competence (QCF)</p> <p>Edexcel Level 3 Diploma in Body Building Competence (QCF)</p>
2		<p>Edexcel BTEC Level 2 Diploma in Light Vehicle Maintenance and Repair Principles (QCF)</p> <p>Edexcel BTEC Level 2 Diploma in Heavy Vehicle Maintenance and Repair Principles (QCF)</p> <p>Edexcel BTEC Level 2 Diploma in Auto Electrical and Mobile Electrical Principles (QCF)</p> <p>Edexcel BTEC Level 2 Diploma in Vehicle Fitting Principles (QCF)</p> <p>Edexcel BTEC Level 2 Diploma in Vehicle Accident Repair Principles (QCF)</p> <p>Edexcel BTEC Level 2 Diploma in Vehicle Accident Repair Body Principles (QCF)</p>	<p>Edexcel Level 2 Diploma in Light Vehicle Maintenance and Repair Competence(QCF)</p> <p>Edexcel Level 2 Diploma in Heavy Vehicle Maintenance and Repair Competence (QCF)</p> <p>Edexcel Level 2 Diploma in Auto Electrical and Mobile Electrical Competence (QCF)</p> <p>Edexcel Level 2 Diploma in Vehicle Fitting Competence (QCF)</p> <p>Edexcel Level 2 Diploma in Vehicle Accident Repair Paint Competence (QCF)</p> <p>Edexcel Level 2 Diploma in Vehicle Accident Repair Body Competence (QCF)</p>

Level	BTEC vocationally-related qualifications	BTEC specialist qualification / professional	NVQ/competence
2		Level 2 Diploma in Lift Truck Maintenance & Repair Principles (QCF) Edexcel BTEC Level 2 Diploma in Motorcycle Maintenance and Repair Principles (QCF) Edexcel BTEC Level 2 Diploma in Vehicle Sales Principles (QCF) Edexcel BTEC Level 2 Diploma in Vehicle Accident Repair Mechanical, Electrical and Trim (MET) Principles (QCF) Edexcel BTEC Level 2 Diploma in Body Building Principles (QCF) Edexcel BTEC Level 2 Diploma in Heavy Vehicle Trailer Maintenance & Repair Principles (QCF)	Edexcel Level 2 Diploma in Lift Truck Maintenance & Repair Competence (QCF) Edexcel Level 2 Diploma in Motorcycle Maintenance and Repair Competence (QCF) Edexcel Level 2 Diploma in Vehicle Sales Competence (QCF) Edexcel Level 2 Diploma in Vehicle Accident Repair Mechanical, Electrical and Trim (MET) Competence (QCF) Edexcel Level 2 Diploma in Body Building Competence (QCF) Edexcel Level 2 Diploma in Heavy Vehicle Trailer Maintenance & Repair Competence (QCF)
1			
Entry			

Annexe B: Centre certification and registration

Edexcel Standards Verifiers will provide support, advice and guidance to centres to achieve Direct Claims Status (DCS). Edexcel will maintain the integrity of Edexcel QCF NVQs through ensuring that the awarding of these qualifications is secure. Where there are quality issues identified in the delivery of programmes, Edexcel will exercise the right to:

- direct centres to take action
- limit or suspend certification
- suspend registration.

The approach of Edexcel in such circumstances is to work with the centre to overcome the problems identified. If additional training is required, Edexcel will aim to secure the appropriate expertise to provide this.

What are the access arrangements and special considerations for the qualifications in this specification?

Centres are required to recruit learners to Edexcel qualifications with integrity.

Appropriate steps should be taken to assess each applicant's potential and a professional judgement should be made about their ability to successfully complete the programme of study and achieve the qualification. This assessment will need to take account of the support available to the learner within the centre during their programme of study and any specific support that might be necessary to allow the learner to access the assessment for the qualification. Centres should consult Edexcel's policy on learners with particular requirements.

Edexcel's policy on access arrangements and special considerations for Edexcel qualifications aims to enhance access to the qualifications for learners with disabilities and other difficulties (as defined by the Equality Act 2010) without compromising the assessment of skills, knowledge, understanding or competence. Please refer to *Access Arrangements and Special Considerations for BTEC and Edexcel NVQ Qualifications* for further details. www.edexcel.com.

Please refer to Edexcel's Equality Policy for further details, www.edexcel.co/policies/pages/home.aspx



THE INSTITUTE OF THE MOTOR INDUSTRY

Assessment Strategy For

Vocational Competency Qualifications (VCQs)

Introduction

This document sets out the recommendations of IMI for the assessment of VCQ qualifications based on IMI developed National Occupational Standards. The Strategy is designed to operate across all four nations, bringing parity to all learners. Awarding Organisations wishing to operate VCQs in the retail motor sector must take full part in the IMI Awarding Body Forum.

This is the overarching strategy for the assessment and verification of competency based qualifications (VCQs) that are based upon National Occupational Standards from the IMI and will come into force on the 30th June 2010, it will apply to any new competence based units and qualifications.

Assessment

VCQs are a type of qualification which reflects the unique needs of the workplace. They should be assessed in a holistic way by technically competent assessors. The primary method of assessment should always be direct workplace observation. Some use of simulation is allowed (please see section on Workplace Assessment/Simulation)

Additionally Awarding Organisations are encouraged to make use of naturally occurring quality assurance and monitoring systems where they exist in workplace assessment environments.

The Institute of the Motor Industry require Awarding Organisations delivering VCQs to participate in an Awarding Body Forum. This will, as a minimum, involve an annual meeting to discuss issues of assessment and verification.

VCQ must attest to competence in an occupational role (where competence is defined as the ability to apply knowledge, understanding, practical and thinking skills to be effective in work: these skills will usually include problem-solving, being flexible to meet changing demands and the ability to work with or alongside others).

Any assessment must attest to competence in an occupational role (where competence is defined as the ability to apply knowledge, understanding, practical and thinking skills to be effective in work: these skills will usually include problem-solving, being flexible to meet changing demands and the ability to work with or alongside others)

Evidence Requirements for VCQ

Candidates working towards a VCQ must provide evidence from the workplace that covers a minimum of a 4 month, (16 week), period.

All evidence for VCQs must be assessed by suitably qualified assessors and must adhere to the requirements for the QCF units being assessed.

Rules of combination

Rules of combination must be that determined by the IMI SSC.

Evidence other than from direct workplace observation

Workplace Assessment/Simulation

IMI credit based units are work/competency based and therefore candidates are to be assessed under normal workplace conditions. It is recognised however, that there are situations where the workplace may not be appropriate or that waiting for naturally occurring evidence is impractical. In these situations IMI will allow centres to set up or devise assessment situations.

These assessment situations can only be set up after:

- all possible routes for the collection of naturally occurring evidence have been exhausted.
- the exact make up and content of the centre devised assessment has been agreed and approved by the external verifier.
- the assessor can assure that the simulation will provide evidence that is valid reliable and authentic

We suggest that centres seek written confirmation before proceeding with assessment. The need for simulation may result from consideration of:

- Safety
- Legislation
- Regulation
- Contingency
- Cost
- Frequency

In addition, IMI recognises that candidates using these credit based units in the context of a Level 1 qualification may be in a learning environment and not in a workplace. In these situations, centres may set up or devise assessment situations as required, with prior written agreement of the external verifier.

Any simulation must be carried out using actual vehicles; the use of engine rigs or electrical boards is not permitted.

IMI re-iterates that its credit based units have been designed to be capable of assessment in the normal workplace and that subject to the arrangements for simulation described above this should be the case.

Simulation will be monitored by the Awarding Organisations and where it is found to be the 'norm' rather than the exception suitable action will need to be taken.

Realistic Work Environment

The IMI requires that candidates are assessed within their normal workplace, or in exceptional circumstances as described previously via simulation. The use of approved simulation means therefore that RWE, Realistic Work Environment is not to be used.

Expert Witnesses

The use of **witness testimony** and **expert witness testimony** are appropriate methods for assessors to collect supplementary evidence on candidates' performance.

Witness testimonies can be obtained from people that are occupationally competent and who may be familiar with the national occupational standards, such as the candidate's line manager.

The assessor must judge the validity of the witness testimony and these may vary depending on the source. Witness testimonies can only support the assessment process and may remove or reduce the need to collect supplementary evidence, however, the awarding organisation's/body's quality assurance requirements must be met. Additionally the person or persons providing the Witness Testimony evidence must make themselves available to the External Verifier for confirmation of evidence validity if required.

Remote Observation

The use of direct observation from a remote location is permitted as long as the centre seeks and receives the approval of their awarding organisation prior to its use and the awarding organisation discusses and agree this with the IMI prior to its use.

Assessor Requirements

The assessment of VCQs must be carried out by approved industry competent assessors.

Assessors will be responsible for, and accountable for, the validity, reliability and authenticity of evidence.

The primary responsibility of the assessor is to ensure that candidates satisfy the requirements of the national occupational standards. It is important that an assessor can recognise occupational competence as specified by the national occupational standards. Assessors therefore need to have a thorough understanding of assessment and quality assurance practices, as well as have in depth technical competence related to the qualifications for which they are assessing candidates.

It will be the responsibility of the approved centre to select and appoint assessors.

It will be the responsibility of the Awarding Organisation to approve centre selected assessors.

To be an approved assessor the person must:

- have sufficient and relevant technical/occupational competence in the Unit, at or above the level of the Unit being assessed
- have in depth knowledge of the Qualification or credit based unit evidence requirements.
- hold or be working towards a relevant assessors award as specified by the Institute of the Motor Industry. This will include, but not be limited to the Assessor qualifications, Level 3 Award in Assessing Competence in the Work Environment, Level 3 Award in Assessing Vocationally Related Achievement, Level 3 Certificate in Assessing Vocational Achievement. (and by implication legacy Assessor units A1, A2 and D32/33 unit) but may be an appropriate equivalent as defined by the IMI, SSC)..
- assessors working towards a relevant assessor qualification must achieve their qualification within 12 months.
- demonstrate knowledge and understanding of the competencies that a learner is required to demonstrate for the qualification that they are undertaking
- provide evidence of completing 5 days working/job shadowing in industry within their professional area in a 24 month period.
- provide evidence of 30 hours of technical/qualification related CPD within a 12 month period.(This is in addition to working/job shadowing).
- be approved by the Awarding Organisation to carry out assessments for the VCQs they are competent in.

Approval of assessors can be **removed**.

Assessors **cannot** assess the VCQ if they are not currently approved by, or have had their approval removed by, the Awarding Organisation.

Internal Verifier Requirements

VCQs must be underpinned by quality assurance appropriate to workplace based delivery. At a minimum this should reflect the principles outlined below.

Internal Verification of VCQ shall be the responsibility of approved industry competent internal verifiers.

The primary responsibility of the internal verifier is to assure the quality and consistency of assessments by the assessors for whom they are responsible. Internal verifiers therefore need to have a thorough understanding of quality assurance and assessment practices, as well as technical competence related to the qualifications that they are internally verifying.

Internal verifiers will be responsible for, and accountable for consistency, quality and reliability of evidence and assessors.

It will be the responsibility of the approved centre to select and appoint internal verifiers.

It will be the responsibility of the Awarding Organisation to approve centre selected internal verifiers.

To be an approved internal verifier the person must:

- have in-depth knowledge of the occupational standards and credit based unit evidence requirements.
- be occupationally aware of the relevant industry sector being internally verified
- hold or be working towards a relevant verifier award as specified by the Institute of the Motor Industry. This will include, but not be limited to the Quality Assurance qualifications Level 4 Award in the Internal Quality Assurance of Assessment Processes and Practice, Level 4 Certificate in Leading the Internal Quality Assurance of Assessment Processes and Practice, (and by implication legacy Internal Verifier unit V1 D34 unit) but may be an appropriate equivalent as defined by the SSC.
- verifiers working towards a relevant qualification must achieve their qualification within 12 months.
- provide evidence of CPD totalling not less than 30 hours from within their professional area within a 12 month period.
- be approved by the Awarding Organisation to carry out internal verification for relevant VCQ(s)
- demonstrate knowledge and understanding of the quality assurance processes required by the centre and the awarding organisation

Approval of internal verifiers can be **removed**.

Internal Verifiers **cannot** verify the VCQ if they are not approved by, or have had their approval removed by the Awarding Organisation.

Multi Discipline Assessors and Internal Verifiers

Assessors and Internal Verifiers who work across multi disciplines must agree to a programme of CPD that will, over an agreed period of time, show their competence across all areas that they assess.

The programme of CPD and the timescale must be agreed for each multi discipline assessor by their External Verifier and may be subject to scrutiny by the IMI.

It is the responsibility of the centre to keep a record of these agreements.

External Verifier Requirements

Awarding Organisations will be responsible for selection and appointment of external verifiers.

To be an approved external verifier or moderator the person must:

- hold or be working towards an appropriate qualification as specified by the Institute of the Motor Industry, confirming their competence to externally verify VCQ assessments This will include, but not be limited to the Level 4 Award in Externally Assuring the Quality of Assessment Processes and Practice, Level 4 Certificate in Leading the External

Quality Assurance of Assessment Processes and Practice, (and by implication legacy External Verifier unit V2 and D35 units) but may be an appropriate equivalent as defined by the SSC.

- external verifiers working towards a relevant qualification must achieve their qualification within 12 months.
- have experience of working within the Automotive Industry gained through current or prior employment in order to have an up to date technical awareness relevant to the VCQ they are seeking to externally verify
- have a sound and in-depth knowledge of the VCQ requirements
- demonstrate their commitment to maintaining their industry knowledge by providing evidence of CPD totalling not less than 30 hours from within their professional area within a 12 month period.

External Quality Control

It is expected that the awarding of qualifications will be underpinned by quality assurance appropriate to workplace based delivery. At a minimum this should reflect the principles outlined below.

External quality control of assessment is the responsibility of the Awarding Organisations, they must ensure that common approaches are employed and that consistent, high standards are achieved.

External verifiers will be required to implement rigorous risk management strategies consistently across all centres for which they are responsible.

IMI recommends that Awarding Organisations adopt a risk rating and risk management system for centres offering IMI VCQs.

IMI recommend that such systems identify:

- Commercial Risk – is there potential for commercial pressures to ensure that candidates achieve qualifications within unduly short time frames?
- Assessment/verification risk – are factors apparent in the relationship between candidates, assessors and verifiers that might prejudice a fair and consistent assessment process?

Where risks or potential risks are identified, IMI expects that the Awarding Organisation, via the external verifier takes appropriate action to ensure that the credibility of the assessment process is not prejudiced.

Awarding Organisations will be responsible for and accountable for the quality of VCQs delivered and assessed by their approved assessment centres.

