

PAAVQ-SET

LEVEL 3 NVQ DIPLOMA IN PROCESS ENGINEERING MAINTENANCE MECHANICAL

Centre Qualification Handbook

Competence-based Qualifications

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INTRODUCTION TO THE HANDBOOK

This qualification sits within the Regulated Qualifications Framework (RQF).

This Qualification Handbook has been developed to ensure that PAA\VQ-SET Centres understand the requirements of the qualification. The Handbook contains the following information:

- Qualification Structure
- Assessment Requirements
- Assessment Methods
- Glossary
- Qualification Units

This Qualification Handbook has been developed to provide support in the implementation of the qualification as well as giving information to ensure that the assessment and quality assurance is consistent, robust and reliable within each centre and nationally. The handbook also contains details of the skills and/or knowledge the learner must obtain to achieve the units and qualification.

Qualification Structure

This section of the handbook summarises the content of the qualification and the skills and/or knowledge learners that achieve it can be expected to gain. It also outlines the units required to achieve the qualification and will give the learner an idea of how long the qualification will take to achieve through the Total Qualification Time (TQT) and how much contact time they can expect through the Guided Learning Hours (GLH). It also provides information about possible progression opportunities once the qualification has been achieved.

Assessment Requirements

The assessment requirements for the qualification will cover any specific information about how the qualification may be assessed, such as whether assessors require specific qualifications or occupational competence and whether simulation is permitted in the achievement process.

Assessment Methods

This section summarises the different assessment methods and types of evidence that support assessment; these may be used to demonstrate competence or the achievement of knowledge and understanding.

Qualification Units

The unit overview summarises the content of the unit and the skills and/or knowledge the learner will have gained on achievement of the unit. The units may also contain additional information in the assessment context which will describe the areas to be covered and any appropriate assessment guidance and evidence requirements which will outline additional assessment requirements and should be built into assessment plans and included on assessment records. The unit detail will also confirm whether simulation is permitted for that particular unit.

Qualification Assessment and Support Materials

Centres will be sent the following qualification assessment and support materials:

- Assessment Forms - it is not mandatory to use these forms. Centres may wish to use their own assessment documentation - these should be approved by the External Verifier prior to use.
- Learner Guide
- Qualification Handbook
- Registration Spreadsheet & Certification Claim Forms

LEVEL 3 NVQ DIPLOMA IN PROCESS ENGINEERING MAINTENANCE - MECHANICAL**Qualification Summary**

This qualification provides recognition of the skills and knowledge of individuals working in a process engineering environment. It covers carrying out handover of process engineering plant and equipment; reinstating the work area after the completion of maintenance; working safely and minimising risks; and maintaining effective working relationships.

Total Qualification Time (TQT) and Guided Learning Hours (GLH)**Guided Learning Hours (GLH)**

Guided Learning Hours are the time the learner is under the immediate supervision or guidance of a lecturer, supervisor, tutor or other appropriate provider or education or training.

The GLH for this qualification is 349

Total Qualification Time (TQT)

Total Qualification Time is comprised of 2 elements:

1. GLH
plus
2. an estimate of the number of hours a learner will reasonably be likely to spend in preparation, study or any other form of participation in education or training, including assessment, which takes place as directed by (but not under the immediate supervision of) a lecturer, supervisor, tutor or other appropriate provider or education or training

The TQT for this qualification is 650

Achieving the Qualification

24 Units must be achieved (12 knowledge and 12 competence units).

Mandatory Units: All 16 Mandatory Units must be achieved

Optional Units Group 1: Learners must achieve 4 units. Knowledge and competence units must be taken in combination i.e. if unit C3.06k is chosen, unit C3.06c must also be completed; and vice-versa.

Optional Units Group 2: Learners must achieve 4 units. Knowledge and competence units must be taken in combination i.e. if unit M3.10k is chosen, unit M3.10c must also be completed; and vice-versa.

Mandatory Units

Unit No.	Unit Name	Credit Value
C2.04k	How to Maintain Effective Working Relationships within Process Engineering Maintenance	1
C2.04c	Maintain Effective Working Relationships within Process Engineering Maintenance	1
C3.01k	How to Carry out Handover of Process Engineering Plant and Equipment	3
C3.01c	Carry out Handover of Process Engineering Plant and Equipment	2
C3.02k	How to Reinstatement the Work Area after Completing the Maintenance of Process Engineering Plant and Equipment	3

C3.02c	Reinstate the Work Area after Completing the Maintenance of Process Engineering Plant and Equipment	2
C3.03k	How to Minimise Risks to Life, Property and the Environment within Process Engineering Environments	3
C3.03c	Minimise Risks to Life, Property and the Environment within Process Engineering Environments	4
C3.04k	How to Work Safely, Minimise Risk and Comply with Emergency Procedures within Process Engineering Environments	3
C3.04c	Work Safely, Minimise Risk and Comply with Emergency Procedures within Process Engineering Environments	3
M3.01k	How to Carry out Planned Maintenance on Mechanical Plant and Equipment	4
M3.01c	Carry out Planned Maintenance on Mechanical Plant and Equipment	4
M3.02k	How to Deal with Variations and Defects in Mechanical Plant and Equipment	3
M3.02c	Deal with Variations and Defects in Mechanical Plant and Equipment	3
M3.03k	How to Diagnose and Determine the Causes of Faults in Mechanical Plant and Equipment	4
M3.03c	Diagnose and Determine the Causes of Faults in Mechanical Plant and Equipment	4

Optional Units - Group 1

Learners must achieve 4 units.

Unit No.	Unit Name	Credit Value
C3.06k	How to Prepare Work Areas for the Maintenance of Process Engineering Plant and Equipment	4
C3.06c	Prepare Work Areas for the Maintenance of Process Engineering Plant and Equipment	3
M3.04k	How to Prepare Equipment in Support of Mechanical Engineering Activities	2
M3.04c	Prepare Equipment in Support of Mechanical Engineering Activities	2
M3.05k	How to Prepare Materials for the Maintenance of Mechanical Plant and Equipment	2
M3.05c	Prepare Materials for the Maintenance of Mechanical Plant and Equipment	2
M3.06k	How to Adjust Mechanical Plant and Equipment to Meet Operational Requirements	3
M3.06c	Adjust Mechanical Plant and Equipment to Meet Operational Requirements	3
M3.07k	How to Carry out the Removal of Components from Mechanical Plant and Equipment	3
M3.07c	Carry out the Removal of Components from Mechanical Plant and Equipment	3

M3.08k	How to Carry out the Replacement of Components from Mechanical Plant and Equipment	3
M3.08c	Carry out the Replacement of Components from Mechanical Plant and Equipment	3
M3.09k	How to Determine the Feasibility of Repair of Components from Mechanical Plant and Equipment	3
M3.09c	Determine the Feasibility of Repair of Components from Mechanical Plant and Equipment	3

Optional Units - Group 2

Learners must achieve 4 units.

Unit No.	Unit Name	Credit Value
M3.10k	How to Interpret Detailed Mechanical Information from Technical Sources	2
M3.10c	Interpret Detailed Mechanical Information from Technical Sources	2
M3.11k	How to Read and Extract Information from Mechanical Engineering Drawings and Specifications	3
M3.11c	Read and Extract Information from Mechanical Engineering Drawings and Specifications	3
M3.12k	How to Identify and Suggest Improvements to Working Practices and Procedures whilst Maintaining Mechanical Plant and Equipment	2
M3.12c	Identify and Suggest Improvements to Working Practices and Procedures whilst Maintaining Mechanical Plant and Equipment	4
M3.13k	How to Establish that a Mechanical Engineering Maintenance Process has been Completed to Specification	3
M3.13c	Establish that a Mechanical Engineering Maintenance Process has been Completed to Specification	3
M3.14k	How to Test the Performance and Condition of Mechanical Plant and Equipment	3
M3.14c	Test the Performance and Condition of Mechanical Plant and Equipment	3
M3.15k	How to Monitor the Performance and Condition of Mechanical Plant and Equipment	4
M3.15c	Monitor the Performance and Condition of Mechanical Plant and Equipment	3
M3.16k	How to Assess the Performance and Condition of Mechanical Plant and Equipment	4
M3.16c	Assess the Performance and Condition of Mechanical Plant and Equipment	4
M3.17k	How to Inspect Mechanical Plant and Equipment	3
M3.17c	Inspect Mechanical Plant and Equipment	3

Progression

This Level 3 Diploma has been developed from the Process Engineering Maintenance National Occupational Standards (NOS).

Further information can be found on the PAA\VQ-SET website www.paa-uk.org or on the Register of Regulated Qualifications website <http://register.ofqual.gov.uk>

ASSESSMENT REQUIREMENTS

Assessors must ensure that, when assessing the skills, knowledge and/or understanding, the evidence produced by learners is:

- Valid - does evidence meet the requirements described in the unit?
- Authentic - has the learner produced the evidence?
- Current - has the evidence been produced recently and does it demonstrate current competence?
- Sufficient - is there enough evidence to demonstrate competence?

to enable reliable and consistent judgements to be made about the achievement of all the requirements of the unit(s) and qualification.

PAA\VQ-SET Centres must ensure that people involved in the assessment process have the appropriate expertise and are adequately informed and supported to fulfil their responsibilities.

ASSESSMENT STRATEGY

Below is the information to support the assessment requirements of the qualification:

- Mandatory use of evidence from workplace performance
- Use of Simulation
- Occupational competence of assessors and verifiers

Mandatory use of evidence from workplace performance

- Unless the use of simulation is expressly permitted within the qualification or unit specific evidence requirements, evidence must demonstrate the learner's competence in a real or realistic environment.
- Knowledge and Understanding will be assessed via (pre-set and/or free form) questions, or by inference from performance, which cover three primary types of knowledge:
 - Knowledge of facts and procedures
 - Understanding of principles, concepts and underpinning procedures
 - How to apply principles and procedures in specific contexts

All questions must be asked by the assessor at appropriate moments throughout the assessment process, preferably linked to observed activity and/or review of documentary evidence. The questions asked of, and answers provided by, the learner must be recorded.

Use of Simulation

- The qualification or unit specific assessment requirements will define where evidence from simulation is acceptable, and in which contexts.

Simulation should be used only where direct evidence of learner performance cannot be obtained. Under these circumstances simulation may be used for summative assessment. Reasons for the use of simulation should be made clear to and agreed by the external verifier and should include the following details:

- which competence (and standards) the simulation was designed to assess;
- the kind of equipment, facilities and physical environment proposed for the simulation of performance. It is unlikely that the External Verifier will approve a simulation if it does not involve real plant and equipment;

- how the simulated activity relates to the learner's normal work context in terms of the pressures of time, access to resources and access to information, and the communication media; and
- how the simulation was set up and conducted, preferably supported by physical evidence such as photographs or inspection of a test rig.

Assessors, internal verifiers and external verifiers should monitor the proportion of evidence generated via simulations to ensure that it is not the primary source of a learner's claim to competence.

- d. Under these circumstances simulations are reserved for aspects of competence illustrated by the following contexts:
- where demonstration of emergency shutdown and related safety procedures would be; **dangerous and/or disruptive** to plant/environment/individuals; **too costly** such as total plant shutdown or dealing with spillage of dangerous substances; where **issues of confidentiality** restrict access to real work opportunities;
 - demonstrating specific aspects of the operation which rarely or never occur due to effective quality assurance systems;
 - the capacity to integrate disparate knowledge to cope with unforeseen events and to solve problems; or
 - aspects of working relationships and communications for which no opportunity has presented for the use of naturally occurring workplace evidence of learner performance.
- e. Simulation must enable the individual to demonstrate competence in a real or realistic work environment. In this context this means in specialist centres which replicate the workplace in terms of equipment and environment, reflect normal working situations and use relevant industrial or commercial standards and procedures. Short work placements or non-realistic work environments which do not replicate the pressures and requirements of normal commercial or industrial activities will not be acceptable. The bulk of the learner's evidence should be drawn from their normal working activity and not consist of artificially contrived opportunities for one-off demonstration of competence. Similarly equipment must be that used in current commercial and industrial contexts. Procedures and standards used should be those which are nationally or internationally recognised or devised by specific companies as standard operating procedure.
- f. Simulation must enable the individual to acquire his/her skills and knowledge in a realistic work environment. In this context this means in specialist centres which replicate the workplace in terms of equipment and environment, it reflects normal working situations and uses relevant industrial or commercial standards and procedures. Where possible providers should attempt to replicate the pressures and requirements of normal commercial or industrial activities. Equipment must be that used in current commercial and industrial contexts. Procedures and standards used should be those which are nationally or internationally recognised or devised by specific companies as standard operating procedure.
- g. Circumstances outside of those listed in Section D above may also be considered suitable for the use of simulation with the agreement of the External Verifier and PAA\VQ-SET. Under these circumstances simulation may be used for formative assessment only.

Occupational competence of Assessor and Verifiers

h. Assessors:

- must be competent in the units they are assessing. This is shown through the assessor having achieved the award they are assessing OR providing quality evidence to the external verifier that they are able to make valid judgements of the competence of learners. This could be done through a combination of a) personal interview, b) review of employment histories and/or c) examination of the assessor's judgement during assessments.
- must have a working knowledge of awards and a full understanding of that part of the award for which they have responsibility.
- should hold or be working towards suitable qualifications for assessment, as defined by PAA\VQ-SET.

i. Internal verifiers:

- must be either working in the appropriate sector itself OR they must be able to demonstrate they possess practical and up-to-date knowledge of current working practices appropriate to the sector in which they are carrying out verification practices; and
- must be appointed by a PAA\VQ-SET recognised centre
- must have a working knowledge of the awards they are internally verifying
- should hold or be working towards suitable qualifications for verification, as defined by PAA\VQ-SET.

ASSESSMENT METHODS AND TYPES OF EVIDENCE

The following section gives information on the different assessment methods/types of evidence that support assessment. The following assessment methods/types of evidence may be used to demonstrate competence or that the learner has achieved the required level of knowledge and understanding.

Observation of Performance

Observation allows the assessor to see learners carrying out their work activities. It will take place primarily in the workplace but can also be undertaken in a training scheme. Natural discussion should take place where possible during observation, allowing the assessor to ask questions relating to what they are observing at the time. Assessors must capture their observations either by a written report and/or other methods (e.g. video, audio recording).

Questioning

This method of assessment can be used to ensure that the learner has knowledge and understanding to support their skills. Questions can be used to check knowledge - these questions can either be verbal during or at the end of an observation, or they can be set in a written format in formal or informal conditions. As some units may focus entirely on learners' knowledge, assessors may encourage a variety of evidence to meet the requirements of the unit - use of verbal and/or written questions, learner statements and professional discussion (see below). Verbal questioning or professional discussion should be captured, either by written notes or audio recording.

Products

Work product evidence may be generated as a result of work activities undertaken by learners, and could include reports, letters, or records of work carried out.

Witness Statement or Testimony

A Witness Statement or Testimony is confirmation by others that the learner carried out an activity or series of activities relevant to the requirements of the unit. It could be written by the learner and signed by the witness to confirm that it did take place, or the witness may write the statement. Alternatively, the assessor could speak to the witness and record the discussion. The statement can then be used as evidence within an assessment.

There may be occasions when an Expert Witness may be required to contribute to the assessment process. PAA\VQ-SET's definition of an Expert Witness is 'an experienced employee who works in partnership with the assessor, by observing the learner carrying out their duties and recording their observations in line with the assessment procedures'. It should be noted that while the Expert Witness makes a valued contribution to the assessment process, it is the assessor who makes the assessment decision.

Simulation

Simulations are a source of performance evidence showing how an activity is carried out. Simulations require careful planning to ensure that they reflect as near as possible "real life" conditions and the requirements of the qualification(s). As a result of this the costs to set up a simulation may be considerable. Simulations are likely to be used in the following situations:

- they occur infrequently (e.g. dealing with emergencies)
- they involve unusual working conditions (e.g. working in isolation, outside the workplace)
- the work is hazardous
- it is not cost effective

Any use of simulation should be discussed and agreed with the PAA\VQ-SET External Verifier and approved prior to implementation.

Recognition of Prior Learning (RPL)

This is the process whereby credit is given to experienced individuals for their previous achievements. It requires careful mapping of the individual's experience to the unit(s) to ensure that it meets the requirements. This exercise must be referred to the External Verifier to ensure that all the evidence presented is acceptable.

Professional Discussion

A Professional Discussion gives the learner the opportunity to tell their assessor what they are doing and why they are doing it in a particular way. The discussion should be supported by appropriate evidence - an observation report, work product or witness testimony. Professional Discussions should be planned to give the learner the chance to prepare, and should be recorded.

Learner Statements

A Learner Statement is an account of an activity that took place, described by the learner. A detailed statement could demonstrate skill, and also provides evidence of knowledge and understanding. Learner statements should be authenticated by an appropriate person.

Photographs and use of other media

Photographs and use of other media, e.g. video and audio, can provide detail of work activities carried out and questioning. Photographs are more effective when used with supporting statements. Video and audio evidence should be effectively referenced to allow specific activities or questioning to be found easily. It is important to note that if photographs and other media are to be used, the learner and assessor should ensure that permission is gained from all people who may be involved.

GLOSSARY

Term	Definition
Access Arrangements	Arrangements that are approved in advance of an examination or assessment to allow achievement to be demonstrated by learners with a disability, special learning needs (including where the learner's first language is not English, Welsh or Irish) or to avoid unlawful discrimination
Appeal	The process through which an awarding organisation may be challenged on the outcome of an enquiry about results or, where appropriate, other procedural decisions affecting a centre or an individual learner
Assessment	The process of making judgements about the extent to which a learner's work meets the requirements of a unit, or any additional assessment requirements of a qualification
Assessor	A person who assesses a learner's work
Award of Qualifications	A certificate (electronic or paper-based) issued to an individual that recognises their achievement
Award	A qualification with a TQT value between 10 and 129
Awarding Organisation	A body recognised by the qualifications regulators to award qualifications
Centre	An organisation accountable to an awarding organisation for assessment arrangements leading to the award of qualifications
Centre Recognition	A process through which a centre wishing to offer an award or awards is confirmed as being able to maintain the required quality and consistency of assessment, and comply with other requirements of the awarding organisation
Certificate (1) for a Unit or Qualification	A record of attainment of a qualification issued by an awarding organisation
Certificate (2)	A qualification with a TQT value between 130 and 369
Credit	An award that may be made to a learner in recognition of the achievement of a unit or qualification
Credit Value	The number of credits that may be awarded to a learner for the successful achievement of a unit or qualification
Diploma	A qualification with a TQT value of 370 or above
Guided Learning Hours	The number of hours of teacher-supervised or directed study time required to teach a qualification or unit of a qualification
Learning Time	The amount of time a learner at the level of the unit is expected to take, on average, to complete the unit to the standard required

Term	Definition
Level	An indication of the relative demand, complexity and/or depth of achievement, and/or the autonomy of the learner in demonstrating that achievement
Mandatory Units	Units that must be achieved for the qualification to be awarded
National Occupational Standards (NOS)	Describe what a person needs to do, know and understand in a job to carry out the role in a consistent and competent way
Optional Unit	A unit that a learner may choose to complete to achieve the required number of units for award of the qualification
Pathway	A route to the achievement of a qualification that requires particular units to be achieved and is identified by an endorsement to a qualification title
Qualification	An award made to a Learner for the achievement of the required units or other components for that qualification
Qualification Level	An indication of the relative demand, complexity and/or depth of achievement, and/or the autonomy of the learner, represented by a qualification
Qualifications Regulators	Government-designated statutory organisations required to establish national standards for qualifications and secure consistent compliance with them
Recognition of Prior Learning (RPL)	A method of assessment that considers whether a learner can demonstrate that they can meet the assessment requirements for a unit through knowledge, understanding or skills they already possess and do not need to develop through a course of learning
Sector Skills Council	A body responsible for formulating and reviewing occupational standards for a specific sector across the UK, and for supporting the development of units and qualifications based on these standards. Each SSC is an employer-led, independent organisation and is licensed by government
Standardisation Of Assessment	A process to ensure that assessment leading to the award of qualifications is applied consistently by individuals, centres and awarding organisations
Unique Learner Number (ULN)	The unique number that is used to identify an individual learner
Unit	A component of a qualification

LEVEL 3 NVQ DIPLOMA IN PROCESS ENGINEERING MAINTENANCE - MECHANICAL

CONTENT OF THE QUALIFICATION**MANDATORY UNITS**

UNIT C2.04K	HOW TO MAINTAIN EFFECTIVE WORKING RELATIONSHIPS WITHIN PROCESS ENGINEERING MAINTENANCE
LEVEL	2
CREDIT VALUE	1
GUIDED LEARNING HOURS	9

Unit Overview

This unit addresses the knowledge required to maintain effective working relationships within process engineering maintenance.

Assessment Guidance and Evidence Requirements

The learner should provide evidence to meet all the required knowledge and understanding within this unit. This could be provided through different types of evidence and assessment methods, for example learner statements, questioning and professional discussion which should be recorded for verification.

- This unit is subject to the requirements set out in the Cogent Assessment Strategy.
- The assumption is made that the learner undertaking this unit will be an operator developing their skills and knowledge and seeking recognition of competence.

Information on use of Assessment Context

This unit is about the learner's knowledge of developing and maintaining effective working relationships with others. This may include colleagues, supervisors and visitors and may be frequent or infrequent. Both oral and written methods will be used.

This unit is common to the Electrical, Mechanical, Instrument and Control disciplines.

During this work the learner must take account of the relevant worksite operational requirements, procedures and safe working practices.

The groups of people with which relationships should be maintained include people with whom the learner comes into contact as part of their work role either on a frequent or regular basis, or occasionally only. Typical relationships could be with:

- Those for whom the learner has responsibility
- Clients
- Other disciplines
- Security/safety personnel
- Those to whom the learner is responsible
- Colleagues
- Suppliers

Effective working relationships require communication with others. This could include:

- Formal/informal
- Oral
- Written

Examples could include:

- Tool box talks
- Safety feedback
- Complaints
- Appraisals/performance reviews
- Inductions
- Production loop
- Liaison between training and workplace contacts

Learning Outcome and Assessment Criteria

Learning outcomes The learner will:	Assessment criteria The learner can:
1. Know how to create and maintain effective working relationships	1.1. Describe how to create and maintain effective working relationships, and why it is important to do so
2. Know how to follow organisational policies and procedures	2.1. Describe own and others responsibilities with regards to lines of communication 2.2. Identify the types of problems that can affect relationships and what actions can be taken to deal with specific difficulties

UNIT C2.04c	MAINTAIN EFFECTIVE WORKING RELATIONSHIPS WITHIN PROCESS ENGINEERING MAINTENANCE
LEVEL	2
CREDIT VALUE	1
GUIDED LEARNING HOURS	9

Unit Overview

This unit addresses the skills required to maintain effective working relationships in process engineering maintenance.

Assessment Guidance and Evidence Requirements

Evidence Requirements

The learner should:

- Demonstrate contributing to effective working relationships on at least 4 different occasions to include:
 - one to one situations
 - working with others
 - giving and receiving feedback from others

Assessment Guidance

- The use of simulation is acceptable in the assessment of this unit.
- This unit is subject to the requirements set out in the Cogent Assessment Strategy.
- This unit should not be taken prior to taking “Unit C2.04k - How to Maintain Effective Working Relationships within Process Engineering Maintenance.”
- The assumption is made that the learner undertaking this unit will be an operator developing their skills and knowledge and seeking recognition of competence.

Competent performance must be demonstrated consistently and supported by evidence from a variety of sources. Evidence should be provided to cover areas of the assessment context relevant to the learner’s workplace.

Information on use of Assessment Context

This unit is about the learner’s competence in developing and maintaining effective working relationships with others. This may include colleagues, supervisors and visitors and may be frequent or infrequent. Both oral and written methods will be used.

This unit is common to the Electrical, Mechanical, Instrument and Control disciplines.

During this work the learner must take account of the relevant worksite operational requirements, procedures and safe working practices.

The groups of people with which relationships should be maintained include people with whom the learner comes into contact as part of their work role either on a frequent or regular basis, or occasionally only. Typical relationships could be with:

- Those for whom the learner has responsibility
- Clients
- Other disciplines
- Security/safety personnel
- Those to whom the learner is responsible

- Colleagues
- Suppliers

Effective working relationships require communication with others. This could include:

- Formal/informal
- Oral
- Written

Examples could include:

- Tool box talks
- Safety feedback
- Complaints
- Appraisals/performance reviews
- Inductions
- Production loop
- Liaison between training and workplace contacts

Learning Outcome and Assessment Criteria

Learning outcomes The learner will:	Assessment criteria The learner can:
1. Be able to establish and maintain effective working relationships	1.1. Establish and maintain effective working relationships
2. Be able to maintain effective communication within working relationships	2.1. Keep others informed about work plans or activities which affect them 2.2. Seek assistance from others in a polite and courteous way without causing undue disruption to normal work activities 2.3. Respond in a timely and positive way when others ask for help or information
3. Be able to deal with disagreements and problems effectively	3.1. Deal with disagreements in an amicable and constructive way so that good relationships are maintained

UNIT C3.01K	HOW TO CARRY OUT HANDOVER OF PROCESS ENGINEERING PLANT AND EQUIPMENT
LEVEL	3
CREDIT VALUE	3
GUIDED LEARNING HOURS	22

Unit Overview

This unit addresses the knowledge required to carry out handover of process engineering plant and equipment.

Assessment Guidance and Evidence Requirements

The learner should provide evidence to meet all the required knowledge and understanding within this unit. This could be provided through different types of evidence and assessment methods, for example learner statements, questioning and professional discussion which should be recorded for verification.

- This unit is subject to the requirements set out in the Cogent Assessment Strategy.
- The assumption is made that the learner undertaking this unit will be an experienced operator/technician seeking recognition of their knowledge.

Information on use of Assessment Context

This unit is about the learner's knowledge of carrying out and completing a safe and effective handover of process plant and equipment. It includes the handover to others and own acceptance and confirmation of responsibility for the control of the process plant and equipment. The learner will be following the organisations safe working practices and working within the work permit procedures.

This unit is common to the Electrical, Mechanical, Instrument and Control disciplines.

During this work the learner must take account of the relevant worksite operational requirements, procedures and safe working practices AS THEY APPLY TO THE LEARNER.

The level and extent of responsibility will involve the learner ensuring the handover is completed by following defined procedures, the learner will be accountable for the integrity of the handover and ensuring it is recorded in a formal manner. In all cases, the learner will still be expected to refer to others for final authorisation, even though the learner remains responsible for identifying and implementing decisions.

The type of plant and equipment to be handed over could include:

- Systems and sub-systems
- Process equipment
- New installations

The handover procedures and environments may include operational or non-operational conditions. A typical example of a handover during operational conditions could be:

- Shift changes on continuous process plants

A typical example of handover under non-operational conditions could be:

- Between maintenance and operational teams at the end of an overhaul
- Handover of a large on-going maintenance project
- Handover from in-house maintenance teams to outside specialists
- Shift to shift

Record and documentation systems and procedures should include the level of detail on the condition of engineering products/assets as required by different parties, how to confirm that information received at handover is accurate and complete, and what the types of situation are where additional information and clarification might be required.

The parties to handover to could include:

- Clients
- Production operations
- Maintenance operations
- Line supervisors

The complexity of handovers could include:

- Written
- Oral
- Test documentation

Learning Outcome and Assessment Criteria

Learning outcomes The learner will:	Assessment criteria The learner can:
1. Know how to carry out handover of process engineering plant and equipment	1.1. Explain own contribution to the handover procedures 1.2. Explain the handover procedures including when and how handover should occur 1.3. Describe the record and documentation systems and procedures 1.4. Explain how to check and confirm the information received at handover is accurate, up-to-date and complete 1.5. Describe the types of support through working relationships that can be offered to those transferring control
2. Know how to follow organisational policies and procedures	2.1. Explain own responsibilities in respect of health, safety and environment, including the limits of own personal responsibility, own legal responsibility for own health and safety and the health and safety of others 2.2. Explain the relevant regulations and the safe working practices and procedures required within own work area 2.3. Explain own responsibilities with regard to the reporting lines and procedures in own working environment and the types of working relationships

UNIT C3.01c	CARRY OUT HANDOVER OF PROCESS ENGINEERING PLANT AND EQUIPMENT
LEVEL	3
CREDIT VALUE	2
GUIDED LEARNING HOURS	6

Unit Overview

This unit addresses the skills required to carry out handover of process engineering plant and equipment.

Assessment Guidance and Evidence Requirements

Evidence Requirements

The learner should:

- Demonstrate at least three instances of exchanging responsibility for the control of products/assets.
 - Including at least one example of carrying out a handover and one example of accepting responsibility during operational conditions
- Show entries in handover logs
- Provide organisational records

Assessment Guidance

- The use of simulation is not acceptable in the assessment of this unit.
- Workplace performance evidence is mandatory.
- This unit is subject to the requirements set out in the Cogent Assessment Strategy.
- This unit should not be taken prior to taking “Unit C3.01k - How to Carry out Handover of Process Engineering Plant and Equipment.”
- The assumption is made that the learner undertaking this unit will be an experienced operator/technician seeking recognition of their competence.

Competent performance must be demonstrated consistently and supported by evidence from a variety of sources. Evidence should be provided to cover areas of the assessment context relevant to the learner’s workplace.

Information on use of Assessment Context

This unit is about the learner’s competence in carrying out and completing a safe and effective handover of process plant and equipment. It includes the handover to others and own acceptance and confirmation of responsibility for the control of the process plant and equipment. The learner will be following the organisations safe working practices and working within the work permit procedures.

This unit is common to the Electrical, Mechanical, Instrument and Control disciplines.

During this work the learner must take account of the relevant worksite operational requirements, procedures and safe working practices AS THEY APPLY TO THE LEARNER.

The level and extent of responsibility will involve the learner ensuring the handover is completed by following defined procedures, the learner will be accountable for the integrity of the handover and ensuring it is recorded in a formal manner. In all cases, the learner will still be expected to refer to others for final authorisation, even though the learner remains responsible for identifying and implementing decisions.

The type of plant and equipment to be handed over could include:

- Systems and sub-systems
- Process equipment

- New installations

The handover procedures and environments may include operational or non-operational conditions. A typical example of a handover during operational conditions could be:

- Shift changes on continuous process plants

A typical example of handover under non-operational conditions could be:

- Between maintenance and operational teams at the end of an overhaul
- Handover of a large on-going maintenance project
- Handover from in-house maintenance teams to outside specialists
- Shift to shift

Record and documentation systems and procedures should include the level of detail on the condition of engineering products/assets as required by different parties, how to confirm that information received at handover is accurate and complete, and what the types of situation are where additional information and clarification might be required.

The parties to handover to could include:

- Clients
- Production operations
- Maintenance operations
- Line supervisors

The complexity of handovers could include:

- Written
- Oral
- Test documentation

Learning Outcome and Assessment Criteria

Learning outcomes The learner will:	Assessment criteria The learner can:
1. Be able to carry out handover of process engineering plant and equipment	1.1. Confirm and define the condition of the engineering products or assets in accordance with specifications 1.2. Make sure the information received at handover is accurate, up-to-date and complete 1.3. Communicate handover of process plant and equipment as specified 1.4. Produce and maintain records of the handover in accordance with organisational procedures
2. Be able to accept and confirm responsibility for the control of process engineering plant and equipment	2.1. Check and confirm that the condition of the engineering products or assets are in an acceptable handover condition 2.2. Clearly define and obtain agreement on the moment of transfer of responsibility 2.3. Seek additional information if there are any areas of doubt or lack of clarity 2.4. Provide proper support and co-ordination to those transferring control 2.5. Confirm and record acceptance and control in line with agreed procedures
3. Be able to work safely at all times	3.1. Work safely at all times, complying with health and safety and other relevant regulations and guidelines

UNIT C3.02K	HOW TO REINSTATE THE WORK AREA AFTER COMPLETING THE MAINTENANCE OF PROCESS ENGINEERING PLANT AND EQUIPMENT
LEVEL	2
CREDIT VALUE	3
GUIDED LEARNING HOURS	26

Unit Overview

This unit addresses the knowledge required to reinstate the work area after completing the maintenance of process engineering plant and equipment safely and effectively.

Assessment Guidance and Evidence Requirements

The learner should provide evidence to meet all the required knowledge and understanding within this unit. This could be provided through different types of evidence and assessment methods, for example learner statements, questioning and professional discussion which should be recorded for verification.

- This unit is subject to the requirements set out in the Cogent Assessment Strategy.
- The assumption is made that the learner undertaking this unit will be an experienced operator with relevant technical training.

Information on use of Assessment Context

This unit is about the learner's knowledge in restoring the work area to a safe condition prior to returning to operations. The learner will be required to identify and separate waste materials for disposal and identify and separate out materials suitable for storage and further use. The learner will be following their organisation's safe working practices at all times and working within the work permit procedures.

This unit is common to the Electrical, Mechanical and Instrument and Control disciplines.

During this work the learner must take account of the relevant worksite operational requirements, procedures and safe working practices AS THEY APPLY TO THE LEARNER.

The level and extent of responsibility will involve the learner being responsible for ensuring the equipment and work site is safe for others or the learner to work on by following defined procedures. The learner will be accountable for the integrity of the work site and ensuring the work is recorded in a formal manner. Authorisation for proceeding with the work will be given by authorised signatories within the Permit to Work system.

The resources to be stored are materials and equipment for use at some time in the future and retained either in secure, enclosed containment or unenclosed within a work area or storage facility. Resources could be identified, sorted, protected and evaluated for further use. Appropriate storage facilities should be used where necessary. Typical resources could include:

- Consumables
- Assembly/alignment aids
- Storing/stacking equipment
- Lifting equipment
- Safety equipment
- Personal Protective Equipment/shielding equipment
- Excess materials
- Process and ancillary equipment
- Industrial gas cylinders
- Tools/equipment
- Protection sheeting

- Re-usable components assemblies

The disposal of hazardous and non-hazardous materials could include:

Non hazardous:

- Packaging/protecting materials
- Swarf
- Material offcuts
- Replaced “lifed” consumables

Hazardous:

- Chemicals and fluids e.g. solvents and cleaning agents
- Sharp objects/offcuts
- Asbestos or asbestos based
- Oils and greases

Learning Outcome and Assessment Criteria

Learning outcomes The learner will:	Assessment criteria The learner can:
1. Know how to maintain their own and others' safety	1.1. Describe their own responsibilities in respect of health and safety and the environment, including their legal responsibilities and the limits of this responsibility 1.2. Identify the relevant regulations and safe working practices required within their work area 1.3. Describe the work area restoration requirements and the relevant health and safety, and organisational safe working practices and procedures
2. Know how to reinstate the work area after completing maintenance of process engineering plant and equipment	2.1. Describe the material and equipment stores procedures and organisational procedures which they have to follow 2.2. Describe the appropriate waste disposal methods and procedures for different types of waste, in accordance with current health and safety regulations, relevant legislation and organisational practice
3. Know how to respond to problems	3.1. Describe their responsibilities with regard to the reporting lines and procedures within the working environment

UNIT C3.02C	REINSTATE THE WORK AREA AFTER COMPLETING THE MAINTENANCE OF PROCESS ENGINEERING PLANT AND EQUIPMENT
LEVEL	2
CREDIT VALUE	2
GUIDED LEARNING HOURS	6

Unit Overview

This unit addresses the skills required to reinstate the work area after completing the maintenance of process engineering plant and equipment safely and effectively.

Assessment Guidance and Evidence Requirements

Evidence Requirements

The learner should:

- Provide evidence for at least three instances of the reinstatement of work area:
 - Including at least one example of storing resources in enclosures
- Show work areas after reinstatement
- Show stored engineering resources
- Show materials that have been prepared

Assessment Guidance

- The use of simulation is not acceptable in the assessment of this unit.
- Workplace performance evidence is mandatory.
- This unit is subject to the requirements set out in the Cogent Assessment Strategy.
- This unit should not be taken prior to taking “Unit C3.02k - How to Reinstatement the Work Area after Completing the Maintenance of Process Engineering Plant and Equipment.”
- The assumption is made that the learner undertaking this unit will be an experienced operator with relevant technical training.

Competent performance must be demonstrated consistently and supported by evidence from a variety of sources. Evidence should be provided to cover areas of the assessment context relevant to the learner’s workplace.

Information on use of Assessment Context

This unit is about the learner’s competence in restoring the work area to a safe condition prior to returning to operations. The learner will be required to identify and separate waste materials for disposal and identify and separate out materials suitable for storage and further use. The learner will be following their organisation’s safe working practices at all times and working within the work permit procedures.

This unit is common to the Electrical, Mechanical and Instrument and Control disciplines.

During this work the learner must take account of the relevant worksite operational requirements, procedures and safe working practices AS THEY APPLY TO THE LEARNER.

The level and extent of responsibility will involve the learner being responsible for ensuring the equipment and work site is safe for others or the learner to work on by following defined procedures. The learner will be accountable for the integrity of the work site and ensuring the work is recorded in a formal manner. Authorisation for proceeding with the work will be given by authorised signatories within the Permit to Work system.

The resources to be stored are materials and equipment for use at some time in the future and retained either in secure, enclosed containment or unenclosed within a work area or storage facility. Resources could be identified, sorted, protected and evaluated for further use. Appropriate storage facilities should be used where necessary. Typical resources could include:

- Consumables
- Assembly/alignment aids
- Storing/stacking equipment
- Lifting equipment
- Safety equipment
- Personal Protective Equipment/shielding equipment
- Excess materials
- Process and ancillary equipment
- Industrial gas cylinders
- Tools/equipment
- Protection sheeting
- Re-usable components assemblies

The disposal of hazardous and non-hazardous materials could include:

Non hazardous:

- Packaging/protecting materials
- Swarf
- Material offcuts
- Replaced “lived” consumables

Hazardous:

- Chemicals and fluids e.g. solvents and cleaning agents
- Sharp objects/offcuts
- Asbestos or asbestos based
- Oils and greases

Learning Outcome and Assessment Criteria

Learning outcomes The learner will:	Assessment criteria The learner can:
1. Maintain their own and others' safety	1.1. Work safely at all times, complying with safety, health and other relevant regulations and guidelines
2. Reinstate the work area after completing maintenance of process engineering plant and equipment	2.1. Separate equipment, components and materials for re-use from waste items and materials 2.2. Store re-useable materials and equipment in an appropriate location 2.3. Dispose of waste materials in line with organisational and environmental safety procedures 2.4. Restore the work areas to a safe condition in accordance with agreed requirements and schedules
3. Respond to problems	3.1. Deal promptly with problems within their control and report those that cannot be solved

UNIT C3.03K	HOW TO MINIMISE RISKS TO LIFE, PROPERTY AND THE ENVIRONMENT WITHIN PROCESS ENGINEERING ENVIRONMENTS
LEVEL	2
CREDIT VALUE	3
GUIDED LEARNING HOURS	26

Unit Overview

This unit addresses the knowledge required to minimise risks to life, property and the environment within process engineering environments.

Assessment Guidance and Evidence Requirements

The learner should provide evidence to meet all the required knowledge and understanding within this unit. This could be provided through different types of evidence and assessment methods, for example learner statements, questioning and professional discussion which should be recorded for verification.

- This unit is subject to the requirements set out in the Cogent Assessment Strategy.
- The assumption is made that the learner undertaking this unit will be an experienced operator/technician seeking recognition of their knowledge.

Information on use of Assessment Context

This unit is about the learner's knowledge of minimising the risks to life, property and the environment. The learner will be required to identify hazards, assess the risks involved, minimise the risks by implementing control measures and providing ongoing monitoring. All the relevant safety systems will require updating.

This unit is common to the Electrical, Mechanical, Instrument and Control disciplines.

During this work the learner must take account of the relevant worksite operational requirements, procedures and safe working practices AS THEY APPLY TO THE LEARNER.

The level and extent of responsibility is limited to working within agreed specifications and following clearly defined procedures with regard to identifying and dealing with risks to life, property and the environment. The learner will be expected to take immediate action appropriate to the circumstances.

The type of hazards involved could be those that may affect the safety and/or integrity of:

- People
- Environment
- Operational Equipment

The risk control measures to be implemented will include those approved by the company.

The type of action to be taken will be limited to own responsibility but could include:

- Removal of the hazard
- Raising the alarm
- Shutting down the process
- Stopping the work

The methods of communicating or reporting actions will be in accordance with the requirements of the company.

Learning Outcome and Assessment Criteria

Learning outcomes The learner will:	Assessment criteria The learner can:
1. Know how to identify hazards and minimise risks	1.1. Identify the types of hazards involving processes, tools, equipment and materials that are likely to be met whilst carrying out the maintenance of plant and equipment 1.2. Describe the actions which can minimise risk from hazards
2. Know the safety assessment methods and reporting procedures	2.1. Describe the safety assessment methods and techniques to be used 2.2. Explain how to carry out a risk assessment correctly 2.3. Explain safety reporting procedures and documentation for own working environment
3. Know how to follow organisational policies and procedures	3.1. Explain what own responsibilities are in respect of health, safety and environment, including the limits of personal responsibility, legal responsibility for own health and safety and the health and safety of others 3.2. Describe the relevant regulations and the safe working practices and procedures required within own work area 3.3. Explain and understand own responsibilities with regard to the reporting lines and procedures for own working environment

UNIT C3.03C	MINIMISE RISKS TO LIFE, PROPERTY AND THE ENVIRONMENT WITHIN PROCESS ENGINEERING ENVIRONMENTS
LEVEL	3
CREDIT VALUE	4
GUIDED LEARNING HOURS	12

Unit Overview

This unit addresses the skills required to minimise risks to life, property and the environment within process engineering environments.

Assessment Guidance and Evidence Requirements

Evidence Requirements

The learner should:

- Provide evidence for at least three instances of contributing to health and safety:
 - Including at least one example of the use of a hazard checking method
 - Including at least one example of identifying a hazard from the immediate working environment
 - Including at least one example of removing hazards
- Demonstrate the health and safety procedures followed
- Provide health and safety records
- Provide safety reports following accidents and/or incidents.

Assessment Guidance

- The use of simulation is acceptable in the assessment of this unit.
- This unit is subject to the requirements set out in the Cogent Assessment Strategy.
- This unit should not be taken prior to taking “Unit C3.03k - How to Minimise Risks to Life, Property and the Environment within Process Engineering Environments.”
- The assumption is made that the learner undertaking this unit will be an experienced operator/technician seeking recognition of their competence.

Competent performance must be demonstrated consistently and supported by evidence from a variety of sources. Evidence should be provided to cover areas of the assessment context relevant to the learner’s workplace.

Information on use of Assessment Context

This unit is about the learner’s competence in minimising the risks to life, property and the environment. The learner will be required to identify hazards, assess the risks involved, minimise the risks by implementing control measures and providing ongoing monitoring. All the relevant safety systems will require updating.

This unit is common to the Electrical, Mechanical, Instrument and Control disciplines.

During this work the learner must take account of the relevant worksite operational requirements, procedures and safe working practices AS THEY APPLY TO THE LEARNER.

The level and extent of responsibility is limited to working within agreed specifications and following clearly defined procedures with regard to identifying and dealing with risks to life, property and the environment. The learner will be expected to take immediate action appropriate to the circumstances.

The type of hazards involved could be those that may affect the safety and/or integrity of:

- People
- Environment
- Operational Equipment

The risk control measures to be implemented will include those approved by the company.

The type of action to be taken will be limited to own responsibility but could include:

- Removal of the hazard
- Raising the alarm
- Shutting down the process
- Stopping the work

The methods of communicating or reporting actions will be accordance with the requirements of the company.

Learning Outcome and Assessment Criteria

Learning outcomes The learner will:	Assessment criteria The learner can:
1. Be able to identify and minimise risks	1.1. Carry out risk assessments correctly 1.2. Identify hazards and assess the level of risk involved 1.3. Minimise the risks and implement control measures in the minimum agreed timescales 1.4. Monitor the effectiveness of the risk control measures and take prompt additional action where needed
2. Be able to communicate all necessary information accurately	2.1. Relay information about risk control measures to those who are affected by them 2.2. Clarify any implications of the risk control measures that are in place, if this is required 2.3. Ensure that information provided for safety system records is clear, accurate and up-to-date
3. Be able to work safely at all times and comply with organisational policies and procedures	3.1. Work safely in accordance with the regulations for own working environment

UNIT C3.04K	HOW TO WORK SAFELY, MINIMISE RISK AND COMPLY WITH EMERGENCY PROCEDURES WITHIN PROCESS ENGINEERING ENVIRONMENTS
LEVEL	2
CREDIT VALUE	3
GUIDED LEARNING HOURS	26

Unit Overview

This unit addresses the knowledge required to work safely, minimise risk and comply with emergency procedures within process engineering environments.

Assessment Guidance and Evidence Requirements

The learner should provide evidence to meet all the required knowledge and understanding within this unit. This could be provided through different types of evidence and assessment methods, for example learner statements, questioning and professional discussion which should be recorded for verification.

- This unit is subject to the requirements set out in the Cogent Assessment Strategy.
- The assumption is made that the learner undertaking this unit will be an operator/technician seeking recognition of their knowledge.

Information on use of Assessment Context

This unit is about the learner's knowledge of working safely, dealing with risks by taking action to minimise the risks and where necessary complying with emergency procedures.

This unit is common to the Electrical, Mechanical, Instrument and Control disciplines.

During this work the learner must take account of the relevant worksite operational requirements, procedures and safe working practices AS THEY APPLY TO THE LEARNER.

The level and extent of responsibility is limited to working within an overall risk control strategy which has been developed by safety specialists and which includes detailed criteria for identifying risks together with clearly defined procedures for action which must be followed. In some cases, the learner may be expected to refer to others for final authorisations, even though the learner remains responsible for identifying and implementing decisions.

The types of contingencies, i.e. accidents and incidents by their very nature are unexpected but the company risk control strategy sets out the responses that the learner should follow in order to limit risks arising.

The actions to be taken could include:

- Isolation of hazard/containment
- Stopping activities
- Reporting to appropriate person
- Restriction of others exposure to hazard
- Implementation of alarm and evacuation procedures to assembly point

Learning Outcome and Assessment Criteria

Learning outcomes The learner will:	Assessment criteria The learner can:
1. Know how to work safely at all times	1.1. Describe how to work safely at all times 1.2. Explain own responsibilities in respect of health, safety and environment, including the limits of personal responsibility, legal responsibility for own health and safety and the health and safety of others 1.3. Explain the relevant regulations and the safe working practices and procedures required within own work area
2. Know and understand first aid procedures	2.1. Identify the sources of competent assistance including the location of local first-aid facilities and first-aiders 2.2. Identify the systems for alerting relevant professional authorities
3. Know how to comply with emergency procedures and reporting procedures	3.1. Explain the procedures for shutdown and evacuation 3.2. Identify where information on shutdown and evacuation procedures can be obtained 3.3. Describe the contingency reporting documentation and systems in own work area 3.4. Describe the reporting procedures for near misses or accidents
4. Know and understand own responsibilities regarding reporting	4.1. Explain own responsibilities with regards to the reporting lines and procedures in own working environment

UNIT C3.04c	WORK SAFELY, MINIMISE RISK AND COMPLY WITH EMERGENCY PROCEDURES WITHIN PROCESS ENGINEERING ENVIRONMENTS
LEVEL	2
CREDIT VALUE	3
GUIDED LEARNING HOURS	6

Unit Overview

This unit addresses the skills required to work safely, minimise risk and comply with emergency procedures within process engineering environments.

Assessment Guidance and Evidence Requirements

Evidence Requirements

The learner should:

- Provide evidence for at least three instances of contributing to health and safety:
 - Including at least one example of using safety equipment
 - Including at least one example of dealing with accidents and/or incidents
 - Including at least one example of minimizing risk of personal injury or damage to equipment
 - Including at least one example of dealing with hazardous malfunctions
 - Including at least one example of following an evacuation procedure
- Demonstrate the health and safety procedures followed
- Provide health and safety records
- Provide safety reports following accidents and incidents

Assessment Guidance

- The use of simulation is acceptable in the assessment of this unit.
- This unit is subject to the requirements set out in the Cogent Assessment Strategy.
- This unit should not be taken prior to taking “Unit C3.04k - How to Work Safely, Minimise Risk and Comply with Emergency Procedures within Process Engineering Environments.”
- The assumption is made that the learner undertaking this unit will be an operator/technician seeking recognition of their competence.

Competent performance must be demonstrated consistently and supported by evidence from a variety of sources. Evidence should be provided to cover areas of the assessment context relevant to the learner’s workplace.

Information on use of Assessment Context

This unit is about the learner’s competence in working safely, dealing with risks by taking action to minimise the risks and where necessary complying with emergency procedures.

This unit is common to the Electrical, Mechanical, Instrument and Control disciplines.

During this work the learner must take account of the relevant worksite operational requirements, procedures and safe working practices AS THEY APPLY TO THE LEARNER.

The level and extent of responsibility is limited to working within an overall risk control strategy which has been developed by safety specialists and which includes detailed criteria for identifying risks together with clearly defined procedures for action which must be followed. In some cases, the learner may be expected to refer to others for final authorisations, even though the learner remains responsible for identifying and implementing decisions.

The types of contingencies, i.e. accidents and incidents by their very nature are unexpected but the company risk control strategy sets out the responses that the learner should follow in order to limit risks arising.

The actions to be taken could include:

- Isolation of hazard/containment
- Stopping activities
- Reporting to appropriate person
- Restriction of others exposure to hazard
- Implementation of alarm and evacuation procedures to assembly point

Learning Outcome and Assessment Criteria

Learning outcomes The learner will:	Assessment criteria The learner can:
1. Be able to work safely at all times	1.1. Work safely at all times, complying with health and safety and other relevant regulations and guidelines 1.2. Deal safely with dangers that can be contained using appropriate equipment and materials, in accordance with organisational policy and procedures
2. Be able to minimise risk of injury and damage	2.1. Take prompt and appropriate action to minimise risk of personal and third party injury as a first priority and then damage to property and equipment
3. Be able to comply with emergency and organisational procedures	3.1. Call for expert help in the event of contingencies occurring, using warning systems as appropriate 3.2. Follow shutdown and evacuation procedures promptly and correctly

UNIT M3.01K	HOW TO CARRY OUT PLANNED MAINTENANCE ON MECHANICAL PLANT AND EQUIPMENT
LEVEL	3
CREDIT VALUE	4
GUIDED LEARNING HOURS	30

Unit Overview

This unit addresses the knowledge required to carry out planned maintenance on mechanical plant and equipment.

Assessment Guidance and Evidence Requirements

The learner should provide evidence to meet all the required knowledge and understanding within this unit. This could be provided through different types of evidence and assessment methods, for example learner statements, questioning and professional discussion which should be recorded for verification.

- This unit is subject to the requirements set out in the Cogent Assessment Strategy.
- The assumption is made that the learner undertaking this unit will be an experienced operator/technician seeking recognition of their knowledge.

Information on use of Assessment Context

This unit is about the learner's knowledge of maintaining mechanical equipment in line with the manufacturer's and organisational practices and procedures. The learner will be required to complete the maintenance procedures in a timely manner, follow procedures and finally complete the appropriate documentation. The learner will be following the organisations safe working practices at all times and working within the work permit procedures.

During this work the learner must take account of the relevant worksite operational requirements, procedures and safe working practices AS THEY APPLY TO THE LEARNER.

The level and extent of responsibility will involve the learner being responsible for ensuring that the maintenance procedures are carried out safely by following company defined procedures. The learner will be accountable for the integrity of the work and ensuring the work is recorded in a formal manner. Authorisation for proceeding with the work will be given by authorised signatories within the permit to work system.

Maintenance schedules and related specifications to be followed could be expected to include:

- Authorisation procedures
- Product worksheets
- Tests
- Internal maintenance schedules
- Safe working practices
- Method statements
- Records
- Timescales

The plant or equipment to be maintained could involve more than one technology and/or involve a significant number of fragile/valued components.

Typical assets could include:

- Prime movers
- Fluid distribution systems
- Transmission system and components

And may include:

- Working within confined spaces
- Working in hazard areas
- Working at height/over water

The maintenance procedures and activities to be followed are fully defined within the company maintenance procedures - typical procedures include:

- Isolation
- De-isolation
- Testing of equipment
- Replenishment/checking levels of consumables
- Tightening of connections/fasteners
- Checking and adjusting mechanical/hydraulic/pneumatic movements/components
- Checking tensions
- Replacement of regularly changed 'lived' components (filters, charts etc)
- Recording data
- Inspection for damage/wear/corrosion/ movement
- Safety limit checks
- Checking output
- Cleaning
- Lubricating
- Replacement of worn/damaged/corroded components

The quality standards and accuracy to be achieved need to be in line with company procedures and manufacturers recommendations.

Learning Outcome and Assessment Criteria

Learning outcomes The learner will:	Assessment criteria The learner can:
1. Know and understand the maintenance schedules, methods and records	1.1. Identify maintenance schedules and related specifications to work to 1.2. Describe which maintenance methods and procedures are standard during maintenance and how they can be modified to optimise work 1.3. Identify the maintenance records and documentation procedures
2. Know own responsibilities and the limits of them	2.1. Explain own responsibilities for the care and control of equipment that are used 2.2. Explain the maintenance authorisation procedures and limits of responsibility and authority in line with the company and manufacturer's procedures 2.3. Describe own responsibilities with regard to the reporting lines and procedures in the working environment 2.4. Explain how to deal with problems within the limits of own authority
3. Know how to identify methods for the disposal of waste	3.1. Identify appropriate methods and waste disposal procedures in relation to legislation, regulation and procedures for waste segregation
4. Know how to follow organisational policies and procedures	4.1. Explain own responsibilities in respect of health, safety and environment, including the limits of personal responsibility, legal responsibility for own health and safety and the health and safety of others 4.2. Explain the relevant regulations and safe working practices and procedures required within own work area

UNIT M3.01c	CARRY OUT PLANNED MAINTENANCE ON MECHANICAL PLANT AND EQUIPMENT
LEVEL	3
CREDIT VALUE	4
GUIDED LEARNING HOURS	10

Unit Overview

This unit addresses the skills required to carry out planned maintenance on mechanical plant and equipment.

Assessment Guidance and Evidence Requirements

Evidence Requirements

The learner should:

- Provide evidence for at least three instances of maintaining engineering assets under complex conditions, including examples of assets that cover three different types of complexity (e.g. more than one technology involved.)
- Demonstrate using two types of resource and making two types of adjustment
- Show organisational records
- Show adjusted assets

Assessment Guidance

- The use of simulation is not acceptable in the assessment of this unit.
- Workplace performance evidence is mandatory.
- This unit is subject to the requirements set out in the Cogent Assessment Strategy.
- This unit should not be taken prior to taking “Unit M3.01k - How to Carry out Planned Maintenance on Mechanical Plant and Equipment.”
- The assumption is made that the learner undertaking this unit will be an experienced operator/technician seeking recognition of their competence.

Competent performance must be demonstrated consistently and supported by evidence from a variety of sources. Evidence should be provided to cover areas of the assessment context relevant to the learner’s workplace.

Information on use of Assessment Context

This unit is about the learner’s competence in maintaining mechanical equipment in line with the manufacturer’s and organisational practices and procedures. The learner will be required to complete the maintenance procedures in a timely manner, follow procedures and finally complete the appropriate documentation. The learner will be following the organisations safe working practices at all times and working within the work permit procedures.

During this work the learner must take account of the relevant worksite operational requirements, procedures and safe working practices AS THEY APPLY TO THE LEARNER.

The level and extent of responsibility will involve the learner being responsible for ensuring that the maintenance procedures are carried out safely by following company defined procedures. The learner will be accountable for the integrity of the work and ensuring the work is recorded in a formal manner. Authorisation for proceeding with the work will be given by authorised signatories within the permit to work system.

Maintenance schedules and related specifications to be followed could be expected to include:

- Authorisation procedures

- Product worksheets
- Tests
- Internal maintenance schedules
- Safe working practices
- Method statements
- Records
- Timescales

The plant or equipment to be maintained could involve more than one technology and/or involve a significant number of fragile/valued components.

Typical assets could include:

- Prime movers
- Fluid distribution systems
- Transmission system and Components

And may include:

- Working within confined spaces
- Working in hazard areas
- Working at height/over water

The maintenance procedures and activities to be followed are fully defined within the company maintenance procedures - typical procedures include:

- Isolation
- De-isolation
- Testing of equipment
- Replenishment/checking levels of consumables
- Tightening of connections/fasteners
- Checking and adjusting mechanical/hydraulic/pneumatic movements/components
- Checking tensions
- Replacement of regularly changed 'lived' components (filters, charts etc)
- Recording data
- Inspection for damage/wear/corrosion/ movement
- Safety limit checks
- Checking output
- Cleaning
- Lubricating
- Replacement of worn/damaged/corroded components

The quality standards and accuracy to be achieved need to be in line with company procedures and manufacturers recommendations.

Learning Outcome and Assessment Criteria

Learning outcomes The learner will:	Assessment criteria The learner can:
1. Be able to carry out planned maintenance procedures	1.1. Follow the relevant maintenance schedules to carry out the required work 1.2. Carry out maintenance activities within the limits of own personal authority 1.3. Carry out the maintenance activities in the specified sequence and in an agreed time scale
2. Be able to report defects and record activities accurately	2.1. Report any instances where the maintenance activities cannot be fully met or where there are identified defects outside the planned schedule 2.2. Complete relevant maintenance records accurately and pass them on to the appropriate person
3. Be able to dispose of waste correctly	3.1. Dispose of waste materials in accordance with safe working practices and approved procedures
4. Be able to work safely at all times	4.1. Work safely at all times, complying with health and safety and other relevant regulations and guidelines

UNIT M3.02k	HOW TO DEAL WITH VARIATIONS AND DEFECTS IN MECHANICAL PLANT AND EQUIPMENT
LEVEL	3
CREDIT VALUE	3
GUIDED LEARNING HOURS	22

Unit Overview

This unit addresses the knowledge required to deal with variations and defects in mechanical plant and equipment.

Assessment Guidance and Evidence Requirements

The learner should provide evidence to meet all the required knowledge and understanding within this unit. This could be provided through different types of evidence and assessment methods, for example learner statements, questioning and professional discussion which should be recorded for verification.

- This unit is subject to the requirements set out in the Cogent Assessment Strategy.
- The assumption is made that the learner undertaking this unit will be an experienced operator/technician seeking recognition of their knowledge.

Information on use of Assessment Context

This unit is about the learner's knowledge of identifying, assessing and dealing with variations and defects in mechanical products or assets. The reporting of recommendations to the appropriate people will be required. The learner will be following the organisations safe working practices at all times and working within the work permit procedures.

During this work the learner must take account of the relevant worksite operational requirements, procedures and safe working practices AS THEY APPLY TO THE LEARNER.

The level and extent of responsibility will involve the learner being responsible for ensuring that the maintenance procedures are carried out safely by following company defined procedures. Responsibility will also include identifying the actions to take when variations and defects are found. The learner will be accountable for the integrity of the work and ensuring the work is recorded in a formal manner. Authorisation for proceeding with the work will be given by authorised signatories within the permit to work system.

The assets or equipment to be maintained could involve more than one technology and/or involve a significant number of fragile/valued components.

Typical assets could include:

- Prime mover
- Fluid distribution systems
- Transmission system and components

And may include:

- Working within confined spaces
- Working in hazardous areas
- Working at height/over water

The engineering drawings and related specifications could include:

- Component
- Assembly
- General arrangements
- Isometrics

- 1st and 3rd angle projections
- Method statements
- Product worksheets
- Tolerances

The type and complexity of defects will vary from severe damage with the potential for immediate failure to minor damage.

Learning Outcome and Assessment Criteria

Learning outcomes The learner will:	Assessment criteria The learner can:
1. Know how to interpret engineering drawings and their related specifications	1.1. Describe the engineering drawings and related specifications to interpret, including technical drawings
2. Know how to identify and deal with variations and defects	2.1. Explain the identification of defects in products and assets including observation and using relevant senses; fault reports; maintenance logs; operations logs 2.2. Identify methods of dealing with defects and variations as defined by the company procedures 2.3. State what factors determine the actions to be taken following a defect/variation 2.4. Describe why it is important to maintain records of the checks made and the assessments that result from those checks 2.5. Indicate what information should be entered on those records and where they should be kept
3. Know how to follow organisational policies and procedures	3.1. Explain own responsibilities in respect of health, safety and environment, including the limits of personal responsibility, legal responsibility for own health and safety and the health and safety of others 3.2. Identify the relevant regulations and the safe working practices and procedures required within own work area 3.3. Outline quality control, systems and documentation procedures that are specified by the company 3.4. Describe the reporting lines and procedures in own working environment

UNIT M3.02c	DEAL WITH VARIATIONS AND DEFECTS IN MECHANICAL PLANT AND EQUIPMENT
LEVEL	3
CREDIT VALUE	3
GUIDED LEARNING HOURS	6

Unit Overview

This unit addresses the skills required to deal with variations and defects in mechanical plant and equipment.

Assessment Guidance and Evidence Requirements

Evidence Requirements

The learner should:

- Provide evidence for at least three instances of dealing with variations and defects
- Provide organisational records

Assessment Guidance

- The use of simulation is not acceptable in the assessment of this unit.
- Workplace performance evidence is mandatory.
- This unit is subject to the requirements set out in the Cogent Assessment Strategy.
- This unit should not be taken prior to taking “Unit M3.02k - How to Deal with Variations and Defects in Mechanical Plant and Equipment.”
- The assumption is made that the learner undertaking this unit will be an experienced operator/technician seeking recognition of their competence.

Competent performance must be demonstrated consistently and supported by evidence from a variety of sources. Evidence should be provided to cover areas of the assessment context relevant to the learner’s workplace.

Information on use of Assessment Context

This unit is about the learner’s competence in identifying, assessing and dealing with variations and defects in mechanical products or assets. The reporting of recommendations to the appropriate people will be required. The learner will be following the organisations safe working practices at all times and working within the work permit procedures.

During this work the learner must take account of the relevant worksite operational requirements, procedures and safe working practices AS THEY APPLY TO THE LEARNER.

The level and extent of responsibility will involve the learner being responsible for ensuring that the maintenance procedures are carried out safely by following company defined procedures. Responsibility will also include identifying the actions to take when variations and defects are found. The learner will be accountable for the integrity of the work and ensuring the work is recorded in a formal manner. Authorisation for proceeding with the work will be given by authorised signatories within the permit to work system.

The assets or equipment to be maintained could involve more than one technology and/or involve a significant number of fragile/valued components.

Typical assets could include:

- Prime mover
- Fluid distribution systems

- Transmission system and components

And may include:

- Working within confined spaces
- Working in hazardous areas
- Working at height/over water

The engineering drawings and related specifications could include:

- Component
- Assembly
- General arrangements
- Isometrics
- 1st and 3rd angle projections
- Method statements
- Product worksheets
- Tolerances

The type and complexity of defects will vary from severe damage with the potential for immediate failure to minor damage.

Learning Outcome and Assessment Criteria

Learning outcomes The learner will:	Assessment criteria The learner can:
1. Be able to identify variations and defects	1.1. Identify defects with regard to the product or asset specification
2. Be able to assess variations and defects	2.1. Assess the defects and determine action required to return the products and assets to specified condition
3. Be able to report and record variations and defects	3.1. Report recommendations for action to the appropriate people promptly and in accordance with organisational procedures 3.2. Record details of defects in accordance with quality assurance and control
4. Be able to deal with the variations or defects	4.1. Repair or replace the defect 4.2. Discard or store the defect
5. Be able to work safely at all times	5.1. Work safely at all times, complying with health and safety and other relevant regulations

UNIT M3.03K	HOW TO DIAGNOSE AND DETERMINE THE CAUSES OF FAULTS IN MECHANICAL PLANT AND EQUIPMENT
LEVEL	4
CREDIT VALUE	4
GUIDED LEARNING HOURS	34

Unit Overview

This unit addresses the knowledge required to diagnose and determine the causes of faults in mechanical plant and equipment.

Assessment Guidance and Evidence Requirements

The learner should provide evidence to meet all the required knowledge and understanding within this unit. This could be provided through different types of evidence and assessment methods, for example learner statements, questioning and professional discussion which should be recorded for verification.

- This unit is subject to the requirements set out in the Cogent Assessment Strategy.
- The assumption is made that the learner undertaking this unit will be an experienced operator/technician seeking recognition of their knowledge.

Information on use of Assessment Context

This unit covers the knowledge required to diagnose and find faults within mechanical plant and equipment. The learner will be required to select the most appropriate fault finding technique and tools to locate the fault and on completion notify the appropriate people. To record the results the learner will follow company procedures and the organisation's safe working practices at all times and work within the work permit procedures.

During this work the learner must take account of the relevant worksite operational requirements, procedures and safe working practices AS THEY APPLY TO THE LEARNER.

The level and extent of responsibility extends to determination and follow up the information needed to support a clear and accurate definition of the problem and the selection and analysis of diagnostic procedures appropriate to the problem as identified. In some cases, the learner may still be expected to refer to others for final authorisations, even though they remain responsible for identifying and implementing decisions.

The type of plant and equipment may be single or multiple technologies. Typical plant and equipment could be:

- Rotating equipment and tools
- Protection methods
- Fluid distribution systems

The types of fault finding techniques or procedures, diagnostic aids and equipment include:

- Function testing
- Comparison diagnosis
- Substitution
- Examination of failed components
- Operational performance testing
- Timed monitoring
- Sectional isolation

The type and range of problems and faults include those arising from environmental factors such as exposure to sudden temperature changes and/or from human error and/or from materials that have been used in or by the plant and equipment and/or from inherent features of the plant and equipment such as design aspects, age, and/or natural wear and tear.

The level and complexity of diagnosis can be achieved by applying procedures which are formally specified or which are devised by the learner in response to the symptoms of the fault.

The record keeping systems and procedures include:

- Test results
- Data sheets
- Company procedures

Learning Outcome and Assessment Criteria

Learning outcomes The learner will:	Assessment criteria The learner can:
1. Know how to use fault diagnostic aids and methods in order to diagnose problems	1.1. Identify fault diagnostic aids including mechanical test equipment, historical data and schematic drawings 1.2. Describe fault finding methods including how to investigate problems 1.3. Identify the extent and location of problems, what to do when causes are difficult to find and which actions can be taken to deal with the fault
2. Know how to analyse methods and techniques while assessing likely risks	2.1. Explain how to analyse methods and techniques of analysis including historical data, comparison and circuit measurements 2.2. Assess the likely risks arising from faults such as fire, electric shock and damage to plant
3. Know how to record details accurately and understand the importance of doing so	3.1. Identify maintenance reporting documentation and control procedures and how descriptions should be presented 3.2. State why it is important to record results of the diagnosis 3.3. Describe why it is important to relay conclusions on to others in a time span appropriate to the nature of the problem
4. Know how to follow organisational policies and procedures	4.1. Identify own responsibilities in respect to health, safety and environment, including the limits of personal responsibility, legal responsibility for own health and safety and the health and safety of others 4.2. State the relevant regulations and the safe working practices and procedures required within own work area 4.3. Explain reporting lines and procedures in own working environment 4.4. Describe company procedures and manufacturers guidelines for the operating and care of test equipment and control procedures

UNIT M3.03C	DIAGNOSE AND DETERMINE THE CAUSES OF FAULTS IN MECHANICAL PLANT AND EQUIPMENT
LEVEL	4
CREDIT VALUE	4
GUIDED LEARNING HOURS	10

Unit Overview

This unit addresses the skills required to diagnose and determine the causes of faults in mechanical plant and equipment.

Assessment Guidance and Evidence Requirements

Evidence Requirements

The learner should:

- Provide evidence for at least three instances of diagnosing faults in engineering products/assets:
 - Including at least two types of problem (e.g. breakdown)
 - Including the use of information from at least two types of sources
 - Including at least two types of causes
 - Including at least three instances of different fault finding technologies
- Demonstrate the diagnostic procedures followed
- Provide organisational reports and records

Assessment Guidance

- The use of simulation is not acceptable in the assessment of this unit.
- Workplace performance evidence is mandatory.
- This unit is subject to the requirements set out in the Cogent Assessment Strategy.
- This unit should not be taken prior to taking “Unit M3.03k - How to Diagnose and Determine the Causes of Faults in Mechanical Plant and Equipment.”
- The assumption is made that the learner undertaking this unit will be an experienced operator/technician seeking recognition of their competence.

Competent performance must be demonstrated consistently and supported by evidence from a variety of sources. Evidence should be provided to cover areas of the assessment context relevant to the learner’s workplace.

Information on use of Assessment Context

This unit covers the competence required to diagnose and find faults within mechanical plant and equipment. The learner will be required to select the most appropriate fault finding technique and tools to locate the fault and on completion notify the appropriate people. To record the results the learner will follow company procedures and the organisation’s safe working practices at all times and work within the work permit procedures.

During this work the learner must take account of the relevant worksite operational requirements, procedures and safe working practices AS THEY APPLY TO THE LEARNER.

The level and extent of responsibility extends to determination and follow up the information needed to support a clear and accurate definition of the problem and the selection and analysis of diagnostic procedures appropriate to the problem as identified. In some cases, the learner may still be expected to refer to others for final authorisations, even though they remain responsible for identifying and implementing decisions.

The type of plant and equipment may be single or multiple technologies. Typical plant and equipment could be:

- Rotating equipment and tools
- Protection methods
- Fluid distribution systems

The types of fault finding techniques or procedures, diagnostic aids and equipment include:

- Function testing
- Comparison diagnosis
- Substitution
- Examination of failed components
- Operational performance testing
- Timed monitoring
- Sectional isolation

The type and range of problems and faults include those arising from environmental factors such as exposure to sudden temperature changes and/or from human error and/or from materials that have been used in or by the plant and equipment and/or from inherent features of the plant and equipment such as design aspects, age, and/or natural wear and tear.

The level and complexity of diagnosis can be achieved by applying procedures which are formally specified or which are devised by the learner in response to the symptoms of the fault.

The record keeping systems and procedures include:

- Test results
- Data sheets
- Company procedures

Learning Outcome and Assessment Criteria

Learning outcomes The learner will:	Assessment criteria The learner can:
1. Be able to investigate and diagnose the possible causes of mechanical faults	1.1. Review and use all relevant information on the symptoms and problems associated with the products or assets 1.2. Investigate and establish the most likely causes of the faults 1.3. Select, use and apply diagnostic techniques, tools and aids to locate faults 1.4. Complete the fault diagnosis within the agreed time and inform the appropriate people when this cannot be achieved
2. Be able to determine mechanical fault causes and record details appropriately	2.1. Determine the implications of the fault in terms of other work and safety considerations 2.2. Use the evidence gained to draw valid conclusions about the nature and probable cause of the fault 2.3. Record details on the extent and location of the faults in an appropriate format
3. Be able to work safely at all times	3.1. Work safely at all times, complying with health and safety and other relevant regulations and guidelines

OPTIONAL UNITS - GROUP 1

UNIT C3.06k	HOW TO PREPARE WORK AREAS FOR THE MAINTENANCE OF PROCESS ENGINEERING PLANT AND EQUIPMENT
LEVEL	3
CREDIT VALUE	4
GUIDED LEARNING HOURS	32

Unit Overview

This unit addresses the knowledge required to prepare the work area for the maintenance of process engineering plant and equipment safely and effectively.

Assessment Guidance and Evidence Requirements

The learner should provide evidence to meet all the required knowledge and understanding within this unit. This could be provided through different types of evidence and assessment methods, for example learner statements, questioning and professional discussion which should be recorded for verification.

- This unit is subject to the requirements set out in the Cogent Assessment Strategy.
- The assumption is made that the learner undertaking this unit will be an experienced operator with relevant technical training.

Information on use of Assessment Context

This unit is about the learner's knowledge in preparing the work area in order to carry out the maintenance of plant and equipment. The learner will be involved in activities such as clearing materials and equipment from the worksite, providing service supplies and completing isolations. The learner will be following their organisation's safe working practices and working within the work permit procedures.

This unit is common to the Mechanical, Electrical and Instrument and Control disciplines.

During this work the learner must take account of the relevant worksite operational requirements, procedures and safe working practices AS THEY APPLY TO THE LEARNER.

The level and extent of responsibility will involve the learner being responsible for ensuring the preparations are carried out safely by following company defined procedures. The learner will be accountable for the integrity of the work and ensuring the work is recorded in a formal manner. Authorisation for proceeding with the work will be given by authorised signatories within the Permit to Work system.

The type of work area preparations could involve ensuring that the location and condition of work environments are appropriate in terms of:

- Layout
- Security
- Safety
- Isolations (where relevant)
- Accessibility

The type of work area protection and safety requirements will take into account any hazards due to the particular working conditions that could also include:

- Working on access structures (scaffold)
- At height
- Inside systems and plant
- Adverse weather conditions

- Confined spaces
- In shafts

Learning Outcome and Assessment Criteria

Learning outcomes The learner will:	Assessment criteria The learner can:
1. Know how to maintain their own and others' safety	1.1. Describe their own responsibilities in respect of health and safety and the environment, including their legal responsibilities and the limits of this responsibility 1.2. Identify the relevant regulations and safe working practices required within their work area
2. Know how to prepare the work area for the maintenance of process engineering plant and equipment	2.1. Describe the work area preparation requirements and methods. This should include how to ensure the location and condition of the work environments are appropriate in terms of: layout; accessibility; isolations; safety; and security 2.2. Describe the connection and operation of the applicable supply services and connection procedures related to the equipment, including pneumatic, electrical and hydraulic tools
3. Know how to respond to problems	3.1. Describe the potential problems and consequences of not preparing work areas correctly and the hazards which may occur 3.2. Describe their responsibilities with regard to the reporting lines and procedures within the working environment

UNIT C3.06C	PREPARE WORK AREAS FOR THE MAINTENANCE OF PROCESS ENGINEERING PLANT AND EQUIPMENT
LEVEL	3
CREDIT VALUE	3
GUIDED LEARNING HOURS	14

Unit Overview

This unit addresses the skills required to prepare the work area for the maintenance of process engineering plant and equipment safely and effectively.

Assessment Guidance and Evidence Requirements

Evidence Requirements

The learner should:

- Provide evidence for at least three instances of the preparation of areas under complex conditions:
 - Including at least two types of work environment
 - Including dealing with disruption to preparations
- Show preparatory work
- Provide organisational records

Assessment Guidance

- The use of simulation is not acceptable in the assessment of this unit.
- Workplace performance evidence is mandatory.
- This unit is subject to the requirements set out in the Cogent Assessment Strategy.
- This unit should not be taken prior to taking “Unit C3.06k - How to Prepare Work Areas for the Maintenance of Process Engineering Plant and Equipment.”
- The assumption is made that the learner undertaking this unit will be an experienced operator with relevant technical training.

Competent performance must be demonstrated consistently and supported by evidence from a variety of sources. Evidence should be provided to cover areas of the assessment context relevant to the learner’s workplace.

Information on use of Assessment Context

This unit is about the learner’s competence in preparing the work area in order to carry out the maintenance of plant and equipment. The learner will be involved in activities such as clearing materials and equipment from the worksite, providing service supplies and completing isolations. The learner will be following their organisation’s safe working practices and working within the work permit procedures.

This unit is common to the Mechanical, Electrical and Instrument and Control disciplines.

During this work the learner must take account of the relevant worksite operational requirements, procedures and safe working practices AS THEY APPLY TO THE LEARNER.

The level and extent of responsibility will involve the learner being responsible for ensuring the preparations are carried out safely by following company defined procedures. The learner will be accountable for the integrity of the work and ensuring the work is recorded in a formal manner. Authorisation for proceeding with the work will be given by authorised signatories within the Permit to Work system.

The type of work area preparations could involve ensuring that the location and condition of work environments are appropriate in terms of:

- Layout
- Security
- Safety
- Isolations (where relevant)
- Accessibility

The type of work area protection and safety requirements will take into account any hazards due to the particular working conditions that could also include:

- Working on access structures (scaffold)
- At height
- Inside systems and plant
- Adverse weather conditions
- Confined spaces
- In shafts

Learning Outcome and Assessment Criteria

Learning outcomes The learner will:	Assessment criteria The learner can:
1. Maintain their own and others safety	1.1. Work safely at all times, complying with safety, health and other relevant regulations and guidelines
2. Prepare the work area for the maintenance of process engineering plant and equipment	2.1. Ensure that the work environment is suitable for the work activities to be undertaken 2.2. Ensure that all necessary service supplies are disconnected and ready for use 2.3. Prepare the work areas so that they are ready for the engineering activities to be carried out 2.4. Make sure that required safety arrangements are in place to protect other workers from activities likely to disrupt normal working 2.5. Report completion of preparations in line with organisational procedures
3. Respond to problems	3.1. Deal promptly and effectively with problems within their control and report those that cannot be resolved

UNIT M3.04k	HOW TO PREPARE EQUIPMENT IN SUPPORT OF MECHANICAL ENGINEERING ACTIVITIES
LEVEL	3
CREDIT VALUE	2
GUIDED LEARNING HOURS	18

Unit Overview

This unit addresses the knowledge required to prepare equipment in support of mechanical engineering activities.

Assessment Guidance and Evidence Requirements

The learner should provide evidence to meet all the required knowledge and understanding within this unit. This could be provided through different types of evidence and assessment methods, for example learner statements, questioning and professional discussion which should be recorded for verification.

- This unit is subject to the requirements set out in the Cogent Assessment Strategy.
- The assumption is made that the learner undertaking this unit will be an experienced operator/technician seeking recognition of their knowledge.

Information on use of Assessment Context

This unit is about the learner's knowledge of preparing mechanical equipment in order to carry out the maintenance of plant and equipment. The learner will be required to obtain and prepare the mechanical equipment including making sure the safety arrangements are in place and report to the appropriate authority when completed. The learner will be following the organisations safe working practices and working within the work permit procedures.

During this work the learner must take account of the relevant worksite operational requirements, procedures and safe working practices AS THEY APPLY TO THE LEARNER.

Equipment safety checks and inspections will be carried out to ensure that there are no obvious faults present, in accordance with company procedures.

The types of equipment to be prepared could include fixed (machine) and/or portable (hand or machine):

- Protective clothing/equipment
- Lifting and handling equipment
- Access structures (typically ladders, steps, trestles, Youngman boards, temporary staging, access hoists... "cherry-pickers")
- Process equipment
- Tools
- Safety equipment/harness
- Temporary electrical supplies

Types of equipment preparation could involve selection, inspection, safety checks, changing settings or calibrating as well as routine checks on its condition, operation, suitability and safety, in compliance with company procedures. Typical preparations could include:

- Identification
- Addition of extra lifting points
- Storage
- Confirming alignment
- Development
- Cleaning
- Protecting/preserving

- Security
- Precision measuring
- Weight confirming/assessment
- Checking quality/quantity
- Asset/product orientation
- Setting out

Equipment care and control procedures could be expected to include:

- Ingress protection ratings
- Explosion protection rating equipment
- Corrosion
- Portable appliance testing
- Heating and ventilation
- Permit systems

Learning Outcome and Assessment Criteria

Learning outcomes The learner will:	Assessment criteria The learner can:
1. Know how to determine equipment preparation	1.1. Explain how to determine the equipment preparations 1.2. Explain how to determine the types of equipment necessary 1.3. Explain the types of decision within own responsibility
2. Know how to prepare equipment accurately	2.1. Explain the equipment preparation methods and procedures 2.2. Identify the types of equipment which may be used 2.3. Describe own responsibilities for ensuring the security of tools and equipment that are used
3. Know how to deal with problems and report completion of preparations	3.1. Identify how to deal with problems within own scope of responsibility 3.2. Explain how to report completion of preparations in line with organisational procedures
4. Know how to follow organisational policies and procedures	4.1. Explain own responsibilities in respect of health, safety and environment, including the limits of personal responsibility, legal responsibility for own health and safety and the health and safety of others 4.2. Explain the relevant regulations and safe working practices and procedures required within own work area 4.3. Explain own responsibilities with regard to the reporting lines and procedures in the working environment

UNIT M3.04c	PREPARE EQUIPMENT IN SUPPORT OF MECHANICAL ENGINEERING ACTIVITIES
LEVEL	3
CREDIT VALUE	2
GUIDED LEARNING HOURS	6

Unit Overview

This unit addresses the skills required to prepare equipment in support of mechanical engineering activities.

Assessment Guidance and Evidence Requirements

Evidence Requirements

The learner should:

- Provide evidence for at least three instances of the preparation of equipment under complex conditions.
 - Including at least two types of work environment
 - Including dealing with disruption to preparations
- Show preparatory work
- Show equipment that has been prepared
- Provide organisational records.

Assessment Guidance

- The use of simulation is not acceptable in the assessment of this unit.
- Workplace performance evidence is mandatory.
- This unit is subject to the requirements set out in the Cogent Assessment Strategy.
- This unit should not be taken prior to taking “Unit M3.04k - How to Prepare Equipment in Support of Mechanical Engineering Activities.”
- The assumption is made that the learner undertaking this unit will be an experienced operator/technician seeking recognition of their competence.

Competent performance must be demonstrated consistently and supported by evidence from a variety of sources. Evidence should be provided to cover areas of the assessment context relevant to the learner’s workplace.

Information on use of Assessment Context

This unit is about the learner’s competence in preparing mechanical equipment in order to carry out the maintenance of plant and equipment. The learner will be required to obtain and prepare the mechanical equipment including making sure the safety arrangements are in place and report to the appropriate authority when completed. The learner will be following the organisations safe working practices and working within the work permit procedures.

During this work the learner must take account of the relevant worksite operational requirements, procedures and safe working practices AS THEY APPLY TO THE LEARNER.

Equipment safety checks and inspections will be carried out to ensure that there are no obvious faults present, in accordance with company procedures.

The types of equipment to be prepared could include fixed (machine) and/or portable (hand or machine):

- Protective clothing/equipment
- Lifting and handling equipment

- Access structures (typically ladders, steps, trestles, Youngman boards, temporary staging, access hoists... “cherry-pickers”)
- Process equipment
- Tools
- Safety equipment/harness
- Temporary electrical supplies

Types of equipment preparation could involve selection, inspection, safety checks, changing settings or calibrating as well as routine checks on its condition, operation, suitability and safety, in compliance with company procedures. Typical preparations could include:

- Identification
- Addition of extra lifting points
- Storage
- Confirming alignment
- Development
- Cleaning
- Protecting/preserving
- Security
- Precision measuring
- Weight confirming/assessment
- Checking quality/quantity
- Asset/product orientation
- Setting out

Equipment care and control procedures could be expected to include:

- Ingress protection ratings
- Explosion protection rating equipment
- Corrosion
- Portable appliance testing
- Heating and ventilation
- Permit systems

Learning Outcome and Assessment Criteria

Learning outcomes The learner will:	Assessment criteria The learner can:
1. Be able to determine and undertake equipment preparation	1.1. Determine the equipment preparation requirements 1.2. Determine the types of equipment which may be used 1.3. Obtain all the required equipment and ensure that it is in a safe and useable condition 1.4. Carry out the necessary preparations to equipment in line with work requirements 1.5. Report completion of preparations in line with organisational procedures
2. Be able to deal with problems effectively	2.1. Deal promptly and effectively with problems within own control and report those that cannot be solved
3. Be able to work safely at all times	3.1. Work safely at all times, complying with health and safety and other relevant regulations and guidelines 3.2. Make sure that required safety arrangements are in place to protect other workers from activities likely to disrupt normal working

UNIT M3.05k	HOW TO PREPARE MATERIALS FOR THE MAINTENANCE OF MECHANICAL PLANT AND EQUIPMENT
LEVEL	3
CREDIT VALUE	2
GUIDED LEARNING HOURS	14

Unit Overview

This unit addresses the knowledge required to prepare materials for the maintenance of mechanical plant and equipment.

Assessment Guidance and Evidence Requirements

The learner should provide evidence to meet all the required knowledge and understanding within this unit. This could be provided through different types of evidence and assessment methods, for example learner statements, questioning and professional discussion which should be recorded for verification.

- This unit is subject to the requirements set out in the Cogent Assessment Strategy.
- The assumption is made that the learner undertaking this unit will be an experienced operator/technician seeking recognition of their knowledge.

Information on use of Assessment Context

This unit is about the learner's knowledge of preparing the materials in order to carry out the maintenance of plant and equipment. The learner will be required to check the quality and quantity of the materials, determine how the materials should be prepared and report on completion. The learner will be following the organisations safe working practices and working within the work permit procedures.

During this work the learner must take account of the relevant worksite operational requirements, procedures and safe working practices AS THEY APPLY TO THE LEARNER.

The level and extent of responsibility will involve the learner being responsible for ensuring that the preparations are carried out safely by following company defined procedures. The learner will be accountable for the integrity of the work and ensuring the work is recorded in a formal manner. Authorisation for proceeding with the work will be given by authorised signatories within the permit to work system.

The type and complexity of material preparations involve standard treatments and/or require taking instrument readings for analysis. Typical preparation could include:

- Identification
- Storage
- Confirming alignment
- Setting out
- Cleaning
- Protecting/preserving
- Security
- Precision measuring
- Checking quality and quantity
- Asset/product orientation

The types of materials could include materials and/or components used in the engineering activity, including:

- Spare parts
- Proprietary items (repair by replacement)

Equipment care and control procedures could be expected to include:

- Ingress protection ratings
- Explosion protection rating equipment
- Corrosion
- Portable appliance testing
- Heating and ventilation
- Permit systems

Learning Outcome and Assessment Criteria

Learning outcomes The learner will:	Assessment criteria The learner can:
1. Know how to prepare materials for maintenance	1.1. Identify the materials to use and recognise defects in the quality of them 1.2. Explain the types of handling and preparation methods and techniques needed for different materials 1.3. Explain how to ensure the appropriate preparations have been carried out to the required standard 1.4. Describe own responsibilities for ensuring the security of the tools and equipment and their control procedures that are used
2. Know how to follow organisational policies and procedures	2.1. Explain own responsibilities in respect of health, safety and environment, including the limits of personal responsibility, legal responsibility for own health and safety and the health and safety of others 2.2. Explain the relevant regulations and safe working practices and procedures required within own work area 2.3. Explain own responsibilities with regard to the reporting lines and procedures in the working environment

UNIT M3.05C	PREPARE MATERIALS FOR THE MAINTENANCE OF MECHANICAL PLANT AND EQUIPMENT
LEVEL	3
CREDIT VALUE	2
GUIDED LEARNING HOURS	6

Unit Overview

This unit addresses the skills required to prepare materials for the maintenance of mechanical plant and equipment.

Assessment Guidance and Evidence Requirements

Evidence Requirements

The learner should:

- Provide evidence for at least three instances of the preparation of materials under complex conditions:
 - Including at least two types of work environment
 - Including dealing with disruptions to preparation
- Show preparatory work
- Show materials that have been prepared
- Provide organisational records

Assessment Guidance

- The use of simulation is not acceptable in the assessment of this unit.
- Workplace performance evidence is mandatory.
- This unit is subject to the requirements set out in the Cogent Assessment Strategy.
- This unit should not be taken prior to taking “Unit M3.05k - How to Prepare Materials for the Maintenance of Mechanical Plant and Equipment.”
- The assumption is made that the learner undertaking this unit will be an experienced operator/technician seeking recognition of their competence.

Competent performance must be demonstrated consistently and supported by evidence from a variety of sources. Evidence should be provided to cover areas of the assessment context relevant to the learner’s workplace.

Information on use of Assessment Context

This unit is about the learner’s competence in preparing the materials in order to carry out the maintenance of plant and equipment. The learner will be required to check the quality and quantity of the materials, determine how the materials should be prepared and report on completion. The learner will be following the organisations safe working practices and working within the work permit procedures.

During this work the learner must take account of the relevant worksite operational requirements, procedures and safe working practices AS THEY APPLY TO THE LEARNER.

The level and extent of responsibility will involve the learner being responsible for ensuring that the preparations are carried out safely by following company defined procedures. The learner will be accountable for the integrity of the work and ensuring the work is recorded in a formal manner. Authorisation for proceeding with the work will be given by authorised signatories within the permit to work.

The type and complexity of material preparations involve standard treatments and/or require taking instrument readings for analysis. Typical preparation could include:

- Identification
- Storage
- Confirming alignment
- Setting out
- Cleaning
- Protecting/preserving
- Security
- Precision measuring
- Checking quality and quantity
- Asset/product orientation

The types of materials could include materials and/or components used in the engineering activity, including:

- Spare parts
- Proprietary items (repair by replacement)

Equipment care and control procedures could be expected to include:

- Ingress protection ratings
- Explosion protection rating equipment
- Corrosion
- Portable appliance testing
- Heating and ventilation
- Permit systems

Learning Outcome and Assessment Criteria

Learning outcomes The learner will:	Assessment criteria The learner can:
1. Be able to prepare materials accurately and report completion	1.1. Obtain all the required materials and check them for quantity and quality 1.2. Determine how the materials need to be prepared 1.3. Carry out the preparations using suitable equipment 1.4. Ensure preparation is carried out to the required standard 1.5. Report completion of preparations in line with organisational procedures
2. Be able to deal with problems effectively	2.1. Deal promptly and effectively with problems within own control and report those that cannot be solved
3. Be able to work safely at all times	3.1. Work safely at all times, complying with health and safety and other relevant regulations and guidelines

UNIT M3.06K	HOW TO ADJUST MECHANICAL PLANT AND EQUIPMENT TO MEET OPERATIONAL REQUIREMENTS
LEVEL	2
CREDIT VALUE	3
GUIDED LEARNING HOURS	26

Unit Overview

This unit addresses the knowledge required to adjust mechanical plant and equipment to meet operational requirements.

Assessment Guidance and Evidence Requirements

The learner should provide evidence to meet all the required knowledge and understanding within this unit. This could be provided through different types of evidence and assessment methods, for example learner statements, questioning and professional discussion which should be recorded for verification.

- This unit is subject to the requirements set out in the Cogent Assessment Strategy.
- The assumption is made that the learner undertaking this unit will be an experienced operator/technician seeking recognition of their knowledge.

Information on use of Assessment Context

This unit is about the learner's knowledge of adjusting mechanical equipment in line with the manufacturer's and organisation's parameters. The learner will be required to identify the equipment to be adjusted, carry out the adjustment and complete the appropriate documentation. The learner will be following the organisations safe working practices and working within the work permit procedures.

During this work the learner must take account of the relevant worksite operational requirements, procedures and safe working practices AS THEY APPLY TO THE LEARNER.

The level and extent of responsibility extends to the interpretation of a specification, selecting and verifying methods, procedures and materials at their discretion to achieve the best possible result in the conditions applying. In some cases, the learner may still be expected to refer to others for final authorisation, even though they remain responsible for identifying and implementing decisions.

The type of equipment to be worked on could involve more than one technology and/or involve a significant number of fragile/valued components and is difficult to access for maintenance.

Typical assets could include:

- Prime movers
- Distribution systems
- Transmission system and components

And may include:

- Work within confined spaces
- Working in hazardous areas
- Working at height/over water

The type and complexity of adjustments to be made could include:

- Pressure control
- Temperature control
- Speed control
- Humidity control
- Flow control

Examples of complexity include:

- Direct adjustment to system component
- Adjustment via control loop
- Adjustment via external control system

The quality standards and accuracy to be achieved are as set down in the work specifications.

Learning Outcome and Assessment Criteria

Learning outcomes The learner will:	Assessment criteria The learner can:
1. Know and understand the maintenance schedules, methods and records	1.1. Identify the relevant maintenance schedules and related specifications 1.2. Describe the maintenance methods and procedures including: • Where to access operating requirements • The specific operating requirements of specific assets • Internal maintenance schedules 1.3. Identify the maintenance records and documentation procedures in line with company and manufacturer's procedures 1.4. Explain the equipment operating and care and control procedures of the equipment in use
2. Know own responsibilities and the limits of them with regards to adjustments procedures	2.1. Explain the maintenance authorisation procedures and limits of responsibility and authority in line with the company and manufacturer's procedures 2.2. Describe own responsibilities with regard to the reporting lines and procedures in the working environment
3. Know how to follow organisational policies and procedures	3.1. Explain own responsibilities in respect of health, safety and environment, including the limits of personal responsibility, legal responsibility for own health and safety and the health and safety of others 3.2. Explain the relevant regulations and safe working practices and procedures required within own work area

UNIT M3.06C	ADJUST MECHANICAL PLANT AND EQUIPMENT TO MEET OPERATIONAL REQUIREMENTS
LEVEL	3
CREDIT VALUE	3
GUIDED LEARNING HOURS	6

Unit Overview

This unit addresses the skills required to adjust mechanical plant and equipment to meet operational requirements.

Assessment Guidance and Evidence Requirements

Evidence Requirements

The learner should:

- Provide evidence for at least three instances of maintaining engineering assets under complex conditions, including examples of assets that cover three different types of complexity (e.g. more than one technology involved)
- Demonstrate using two types of resources including and making two types of adjustment
- Show organisational records
- Show adjusted assets

Assessment Guidance

- The use of simulation is not acceptable in the assessment of this unit.
- Workplace performance evidence is mandatory.
- This unit is subject to the requirements set out in the Cogent Assessment Strategy.
- This unit should not be taken prior to taking “Unit M3.06k - How to Adjust Mechanical Plant and Equipment to Meet Operational Requirements.”
- The assumption is made that the learner undertaking this unit will be an experienced operator/technician seeking recognition of their competence.

Competent performance must be demonstrated consistently and supported by evidence from a variety of sources. Evidence should be provided to cover areas of the assessment context relevant to the learner’s workplace.

Information on use of Assessment Context

This unit is about the learner’s competence in adjusting mechanical equipment in line with the manufacturer’s and organisation’s parameters. The learner will be required to identify the equipment to be adjusted, carry out the adjustment and complete the appropriate documentation. The learner will be following the organisations safe working practices and working within the work permit procedures.

During this work the learner must take account of the relevant worksite operational requirements, procedures and safe working practices AS THEY APPLY TO THE LEARNER.

The level and extent of responsibility extends to the interpretation of a specification, selecting and verifying methods, procedures and materials at their discretion to achieve the best possible result in the conditions applying. In some cases, the learner may still be expected to refer to others for final authorisation, even though they remain responsible for identifying and implementing decisions.

The type of equipment to be worked on could involve more than one technology and/or involve a significant number of fragile/valued components and is difficult to access for maintenance.

Typical assets could include:

- Prime movers
- Distribution systems
- Transmission system and components

And may include:

- Work within confined spaces
- Working in hazardous areas
- Working at height/over water

The type and complexity of adjustments to be made could include:

- Pressure control
- Temperature control
- Speed control
- Humidity control
- Flow control

Examples of complexity include:

- Direct adjustment to system component
- Adjustment via control loop
- Adjustment via external control system

The quality standards and accuracy to be achieved are as set down in the work specifications.

Learning Outcome and Assessment Criteria

Learning outcomes The learner will:	Assessment criteria The learner can:
1. Identify the equipment to be adjusted	1.1. Follow the appropriate operating specifications for the equipment being maintained
2. Be able to carry out the required adjustments	2.1. Carry out adjustments within the limits of own personal authority 2.2. Make the required adjustments in the specified sequence and in an agreed time scale
3. Be able to complete the adjustment process	3.1. Confirm that the adjusted equipment meets the required operating specification 3.2. Report any instances where the equipment fails to meet the required performance after adjustments or where there are identified defects outside the required adjustments 3.3. Maintain documentation in accordance with organisational requirements
4. Be able to work safely at all times	4.1. Work safely at all times, complying with health and safety and other relevant regulations and guidelines

UNIT M3.07k	HOW TO CARRY OUT THE REMOVAL OF COMPONENTS FROM MECHANICAL PLANT AND EQUIPMENT
LEVEL	3
CREDIT VALUE	3
GUIDED LEARNING HOURS	26

Unit Overview

This unit addresses the knowledge required to carry out the removal of components from mechanical plant and equipment.

Assessment Guidance and Evidence Requirements

The learner should provide evidence to meet all the required knowledge and understanding within this unit. This could be provided through different types of evidence and assessment methods, for example learner statements, questioning and professional discussion which should be recorded for verification.

- This unit is subject to the requirements set out in the Cogent Assessment Strategy.
- The assumption is made that the learner undertaking this unit will be an experienced operator/technician seeking recognition of their knowledge.

Information on use of Assessment Context

This unit is about the learner's knowledge of removing components from mechanical equipment using manufacturer's procedures. The learner will be required to ensure suitable precautions are taken to prevent the escape of liquids or gases. Following removal, the components should be labelled and stored according to organisational procedures. The learner will be following the organisations safe working practices and working within the work permit procedures.

During this work the learner must take account of the relevant worksite operational requirements, procedures and safe working practices AS THEY APPLY TO THE LEARNER.

The level and extent of responsibility will involve the learner being responsible for ensuring that the equipment and work site is safe for others or self to work in by following company defined procedures. The learner will be accountable for the integrity of the work site and ensuring the work is recorded in a formal manner. Authorisation for proceeding with the work will be given by authorised signatories within the permit to work system.

The engineering drawings and related specifications could include:

- Component
- Assembly
- General arrangements
- Isometrics
- 1st and 3rd angle projections
- Method statements
- Product worksheets
- Tolerances

The equipment to be worked on may be robust or fragile. Robust components are those that are resistant to most forms of damage or disruption during their working lives. Fragile components are those that are easily disrupted or damaged. Damage or disruption could be due to physical, chemical or other forces (e.g. Electro-magnetic).

Typical equipment could be:

- Heat exchangers
- Pumps

- Engines
- Components of process systems

The type of components to be removed could include:

- Components of mechanical/hydraulic/pneumatic systems
- Mechanical metering devices
- Components of engines
- Safety limit protection devices
- Actuators
- Components of pumps

The removal techniques or procedures to be followed should involve components to be removed that may require a sequential series of steps to complete the removal. The components may be difficult to access and may be surrounded by other fragile/valued components and may need specialised tooling requirements. Removal may involve more than one technology and/or involve a significant number of fragile components.

The disposal of unwanted components and substances should include what substances could be released during removal of components, which risks are associated with the release of substances and where to access information on the environmental standards, including an appreciation of Control of Substances Hazardous to Health (COSHH), Safety and Emergency Preparedness Analysis (SEPA) and company procedures.

The specifications to which a learner would be expected to work to could include:

- Percussion
- Pressure/hydraulic
- Mechanical strip
- Thermal techniques
- Manual handling
- Lifting Operations and Lifting Equipment Regulations (LOLER)

The removal operations should be complex. Complex removal/replacement refers to situations where components can only be removed or replaced by dismantling the surrounding areas e.g. by cutting and/or where removal/replacement of one component necessitates removal/replacement of the other interacting components.

Learning Outcome and Assessment Criteria

Learning outcomes The learner will:	Assessment criteria The learner can:
1. Know how to interpret engineering drawings and their related specifications	1.1. Identify maintenance schedules and related specifications to work to
2. Know how to remove components correctly	2.1. Explain the types of component removal methods and techniques including isolations and connections that have to be made, and which tools, equipment and methods can be used to remove specific components from specific plant and equipment 2.2. Explain how to ensure the removal of components is carried out to the required standard 2.3. Explain how to identify component defects that have been removed 2.4. Identify the tool and equipment care and control procedures including own responsibilities for ensuring the security of tools and equipment that are used
3. Know how to store and dispose of components	3.1. Explain how to label and store components for re-use and what the available marking systems are for specific components and connections 3.2. Describe how to dispose of unwanted components and substances
4. Know how to follow organisational policies and procedures	4.1. Explain own responsibilities in respect of health, safety and environment, including the limits of personal responsibility, legal responsibility for own health and safety and the health and safety of others 4.2. Explain the relevant regulations and safe working practices and procedures required within own work area 4.3. Identify own responsibilities with regard to the reporting lines and procedures in the working environment

UNIT M3.07c	CARRY OUT THE REMOVAL OF COMPONENTS FROM MECHANICAL PLANT AND EQUIPMENT
LEVEL	3
CREDIT VALUE	3
GUIDED LEARNING HOURS	6

Unit Overview

This unit addresses the skills required to carry out the removal of components from mechanical plant and equipment.

Assessment Guidance and Evidence Requirements

Evidence Requirements

The learner should:

- Provide evidence for at least three instances of the removal of components from different types of assets.
- Mark component orientation for re-assembly
- Provide organisational records

Assessment Guidance

- The use of simulation is not acceptable in the assessment of this unit.
- Workplace performance evidence is mandatory.
- This unit is subject to the requirements set out in the Cogent Assessment Strategy.
- This unit should not be taken prior to taking “Unit M3.07k - How to Carry out the Removal of Components from Mechanical Plant and Equipment.”
- The assumption is made that the learner undertaking this unit will be an experienced operator/technician seeking recognition of their competence.

Competent performance must be demonstrated consistently and supported by evidence from a variety of sources. Evidence should be provided to cover areas of the assessment context relevant to the learner’s workplace.

Information on use of Assessment Context

This unit is about the learner’s competence in removing components from mechanical equipment using manufacturer’s procedures. The learner will be required to ensure suitable precautions are taken to prevent the escape of liquids or gases. Following removal, the components should be labelled and stored according to organisational procedures. The learner will be following the organisations safe working practices and working within the work permit procedures.

During this work the learner must take account of the relevant worksite operational requirements, procedures and safe working practices AS THEY APPLY TO THE LEARNER.

The level and extent of responsibility will involve the learner being responsible for ensuring that the equipment and work site is safe for others or self to work in by following company defined procedures. The learner will be accountable for the integrity of the work site and ensuring the work is recorded in a formal manner. Authorisation for proceeding with the work will be given by authorised signatories within the permit to work system.

The engineering drawings and related specifications could include:

- Component
- Assembly

- General arrangements
- Isometrics
- 1st and 3rd angle projections
- Method statements
- Product worksheets
- Tolerances

The equipment to be worked on may be robust or fragile. Robust components are those that are resistant to most forms of damage or disruption during their working lives.

Fragile components are those that are easily disrupted or damaged. Damage or disruption could be due to physical, chemical or other forces (e.g. Electro-magnetic).

Typical equipment could be:

- Heat exchangers
- Pumps
- Engines
- Components of process systems

The type of components to be removed could include:

- Components of mechanical/hydraulic/pneumatic systems
- Mechanical metering devices
- Components of engines
- Safety limit protection devices
- Actuators
- Components of pumps

The removal techniques or procedures to be followed should involve components to be removed that may require a sequential series of steps to complete the removal. The components may be difficult to access and may be surrounded by other fragile/valued components and may need specialised tooling requirements. Removal may involve more than one technology and/or involve a significant number of fragile components.

The disposal of unwanted components and substances should include what substances could be released during removal of components, which risks are associated with the release of substances and where to access information on the environmental standards, including an appreciation of Control of Substances Hazardous to Health (COSHH), Safety and Emergency Preparedness Analysis (SEPA) and company procedures.

The specifications to which a learner would be expected to work to could include:

- Percussion
- Pressure/hydraulic
- Mechanical strip
- Thermal techniques
- Manual handling
- Lifting Operations and Lifting Equipment Regulations (LOLER)

The removal operations should be complex. Complex removal/replacement refers to situations where components can only be removed or replaced by dismantling the surrounding areas e.g. by cutting and/or where removal/replacement of one component necessitates removal/replacement of the other interacting components.

Learning Outcome and Assessment Criteria

Learning outcomes The learner will:	Assessment criteria The learner can:
1. Be able to carry out the preparations for the removal of components	1.1. Establish, and where appropriate, mark component orientation for re-assembly 1.2. Ensure that any stored energy or substances are released safely and correctly
2. Be able to remove components	2.1. Remove the required components using approved tools and techniques 2.2. Take suitable precautions to prevent damage to components, tools and equipment during removal 2.3. Check the condition of the removed components and record those that will require replacing 2.4. Ensure the removal of components is carried out to the required standard
3. Be able to complete the removal process	3.1. Label and store or discard the removed components in an appropriate location and in accordance with approved procedures 3.2. Maintain documentation in accordance with organisational requirements
4. Be able to work safely at all times	4.1. Work safely at all times, complying with health and safety and other relevant regulations and guidelines

UNIT M3.08k	HOW TO CARRY OUT THE REPLACEMENT OF COMPONENTS FROM MECHANICAL PLANT AND EQUIPMENT
LEVEL	3
CREDIT VALUE	3
GUIDED LEARNING HOURS	26

Unit Overview

This unit addresses the knowledge required to carry out the replacement of components from mechanical plant and equipment.

Assessment Guidance and Evidence Requirements

The learner should provide evidence to meet all the required knowledge and understanding within this unit. This could be provided through different types of evidence and assessment methods, for example learner statements, questioning and professional discussion which should be recorded for verification.

- This unit is subject to the requirements set out in the Cogent Assessment Strategy.
- The assumption is made that the learner undertaking this unit will be an experienced operator/technician seeking recognition of their knowledge.

Information on use of Assessment Context

This unit is about the learner's knowledge of replacing components in mechanical plant and equipment. The learner will be required to ensure the replaced components meet the required specifications, protect them from damage, replace using the appropriate tools and techniques and make any final adjustments. The learner will be following the organisations safe working practices and working within the work permit procedures.

During this work the learner must take account of the relevant worksite operational requirements, procedures and safe working practices AS THEY APPLY TO THE LEARNER.

The level and extent of responsibility will involve the learner being responsible for ensuring that the equipment and work site is safe for others or self to work in by following company defined procedures. The learner will be accountable for the integrity of the work site and ensuring the work is recorded in a formal manner. Authorisation for proceeding with the work will be given by authorised signatories within the permit to work system.

The engineering drawings and related specifications could include:

- Component
- Assembly
- General arrangements
- Isometrics
- 1st and 3rd angle projections
- Method statements
- Product worksheets
- Tolerances

The equipment to be worked on are those that are resistant to most forms of danger or disruption during their working lives. Fragile components could be due to physical, chemical or other forces (e.g. Electro-magnetic).

Typical equipment could be:

- Heat exchangers
- Pumps

- Engines
- Components of process systems

The type of components to be replaced could be:

- Components of mechanical/hydraulic/pneumatic systems
- Mechanical metering devices
- Gaskets
- Components of engines
- Safety limit protection devices
- Actuators/valves
- Components of pumps
- Bearings

Equipment care and control procedures could be expected to include:

- Ingress protection ratings
- Explosion protection rating equipment
- Corrosion
- Portable appliance testing
- Heating and ventilation
- Permit systems

The assembly methods and techniques could involve:

- Hydraulic
- Thermal
- Lifting Operations and Lifting Equipment Regulations (LOLER) and manual handling

The replacement operations should be complex. Complex replacements refers to situations where the components can only be replaced by disrupting the surrounding areas e.g. by cutting or de-soldering and/or where replacement of one component necessitates replacement of other interacting components.

The quality standards and accuracy to be achieved are as set down in the work specifications.

Learning Outcome and Assessment Criteria

Learning outcomes The learner will:	Assessment criteria The learner can:
1. Know how to interpret engineering drawings and their related specifications	1.1. Identify maintenance schedules and related specifications to work to
2. Know how to carry out the replacement of components including the methods and equipment to use	2.1. Explain the types of component replacement methods and techniques, including the types of reconnection that have to be made, and which tools, equipment and methods can be used to replace specific components from specific products/assets 2.2. Explain how to ensure the replacement of components is carried out to the required standard 2.3. Explain the handling methods and techniques including manual handling pressure and thermal methods and techniques 2.4. Identify own responsibilities for ensuring the care and security of tools and equipment that are used
3. Know how to follow organisational policies and procedures	3.1. Explain own responsibilities in respect of health, safety and environment, including the limits of personal responsibility, legal responsibility for own health and safety and the health and safety of others 3.2. Explain the relevant regulations and safe working practices and procedures required within own work area 3.3. Identify own responsibilities with regard to the reporting lines and procedures in the working environment

UNIT M3.08c	CARRY OUT THE REPLACEMENT OF COMPONENTS FROM MECHANICAL PLANT AND EQUIPMENT
LEVEL	3
CREDIT VALUE	3
GUIDED LEARNING HOURS	6

Unit Overview

This unit addresses the skills required to carry out the replacement of components from mechanical plant and equipment.

Assessment Guidance and Evidence Requirements

Evidence Requirements

The learner should:

- Provide evidence for at least three instances of replacing components for different types of products/assets
- Provide organisational records

Assessment Guidance

- The use of simulation is not acceptable in the assessment of this unit.
- Workplace performance evidence is mandatory.
- This unit is subject to the requirements set out in the Cogent Assessment Strategy.
- This unit should not be taken prior to taking “Unit M3.08k - How to Carry out the Replacement of Components from Mechanical Plant and Equipment.”
- The assumption is made that the learner undertaking this unit will be an experienced operator/technician seeking recognition of their competence.

Competent performance must be demonstrated consistently and supported by evidence from a variety of sources. Evidence should be provided to cover areas of the assessment context relevant to the learner’s workplace.

Information on use of Assessment Context

This unit is about the learner’s competence in replacing components in mechanical plant and equipment. The learner will be required to ensure the replaced components meet the required specifications, protect them from damage, replace using the appropriate tools and techniques and make any final adjustments. The learner will be following the organisations safe working practices and working within the work permit procedures.

During this work the learner must take account of the relevant worksite operational requirements, procedures and safe working practices AS THEY APPLY TO THE LEARNER.

The level and extent of responsibility will involve the learner being responsible for ensuring that the equipment and work site is safe for others or self to work in by following company defined procedures. The learner will be accountable for the integrity of the work site and ensuring the work is recorded in a formal manner. Authorisation for proceeding with the work will be given by authorised signatories within the permit to work system.

The engineering drawings and related specifications could include:

- Component
- Assembly
- General arrangements

- Isometrics
- 1st and 3rd angle projections
- Method statements
- Product worksheets
- Tolerances

The equipment to be worked on are those that are resistant to most forms of danger or disruption during their working lives. Fragile components could be due to physical, chemical or other forces (e.g. Electro-magnetic).

Typical equipment could be:

- Heat exchangers
- Pumps
- Engines
- Components of process systems

The type of components to be replaced could be:

- Components of mechanical/hydraulic/pneumatic systems
- Mechanical metering devices
- Gaskets
- Components of engines
- Safety limit protection devices
- Actuators/valves
- Components of pumps
- Bearings

Equipment care and control procedures could be expected to include:

- Ingress protection ratings
- Explosion protection rating equipment
- Corrosion
- Portable appliance testing
- Heating and ventilation
- Permit systems

The assembly methods and techniques could involve:

- Hydraulic
- Thermal
- Lifting Operations and Lifting Equipment Regulations (LOLER) and manual handling

The replacement operations should be complex. Complex replacements refers to situations where the components can only be replaced by disrupting the surrounding areas e.g. by cutting or de-soldering and/or where replacement of one component necessitates replacement of other interacting components.

The quality standards and accuracy to be achieved are as set down in the work specifications.

Learning Outcome and Assessment Criteria

Learning outcomes The learner will:	Assessment criteria The learner can:
1. Be able to carry out the preparations needed in order to replace components	1.1. Obtain all the required components and ensure that they are in a suitable condition for replacement and fit for purpose 1.2. Ensure that any replacement components used meet the required specification
2. Be able to replace and adjust components correctly	2.1. Take adequate precautions to prevent damage to components, tools and equipment during replacement 2.2. Replace the components in the correct sequence using appropriate tools and techniques 2.3. Make any necessary settings or adjustments to the components to ensure they will function correctly 2.4. Ensure the replacement of components is carried out to the required standard
3. Be able to deal with problems effectively	3.1. Deal promptly and effectively with problems within own control and report those that cannot be solved
4. Be able to follow organisational policies and procedures	4.1. Work safely at all times, complying with health and safety and other relevant regulations and guidelines 4.2. Maintain documentation in accordance with organisational requirements

UNIT M3.09k	HOW TO DETERMINE THE FEASIBILITY OF REPAIR OF COMPONENTS FROM MECHANICAL PLANT AND EQUIPMENT
LEVEL	3
CREDIT VALUE	3
GUIDED LEARNING HOURS	28

Unit Overview

This unit addresses the knowledge required to determine the feasibility of repair of components from mechanical plant and equipment.

Assessment Guidance and Evidence Requirements

The learner should provide evidence to meet all the required knowledge and understanding within this unit. This could be provided through different types of evidence and assessment methods, for example learner statements, questioning and professional discussion which should be recorded for verification.

- This unit is subject to the requirements set out in the Cogent Assessment Strategy.
- The assumption is made that the learner undertaking this unit will be an experienced operator/technician seeking recognition of their knowledge.

Information on use of Assessment Context

This unit is about the learner's knowledge of establishing deviation from the required tolerances and what action to take to bring the component back into service. The learner will be following the organisations safe working practices and working within the work permit procedures.

During this work the learner must take account of the relevant worksite operational requirements, procedures and safe working practices AS THEY APPLY TO THE LEARNER.

The level and extent of responsibility will involve the learner being responsible for ensuring that the equipment and work site is safe for others or self to work in by following company defined procedures. The learner will be accountable for the integrity of the work site and ensuring the work is recorded in a formal manner. Authorisation for proceeding with the work will be given by authorised signatories within the permit to work system.

The engineering drawings and related specifications could include:

- Component
- Assembly
- General arrangements
- Isometrics
- 1st and 3rd angle projections
- Method statements
- Product worksheets
- Tolerances

The type of components to be repaired may be robust or fragile. Robust components are those which are resistant to most forms of damage or disruption during their working lives. Fragile components are those which are easily disrupted or damaged. Damage or disruption could be due to physical, chemical or other forces (e.g. Electro-magnetic).

Typical robust components could be:

- Components of power/lighting transmission
- Motors/components of motors

- Components of electrical back-up systems
- Heat exchangers
- Components of process control systems

Typical fragile components could be:

- Components of electrical circuit protectors
- Electrical metering devices
- Circuit boards
- Safety/protection devices
- Components of electrical panels

Assessing conditions of components for re-use and determining the feasibility and viability of repairs could be expected to include mechanical integrity.

Component replacement methods and techniques could be expected to include manufacturer's data and sources of information.

The type of repair to be made requires one or more techniques to be applied depending upon its complexity. The techniques are standard within the sector but may require some modification to achieve the required result. The techniques may relate to one or more technologies depending upon the complexity of the repair.

Typical repair techniques could include:

- Re-aligning
- Re-shaping by material removal
- Re-soldering
- Bonding
- Replacing

The nature of repairs to be carried out should be complex. Complex repairs are those which can only be achieved using tools and techniques which have been specially modified in some way to achieve the repair and/or where no pre-defined procedures exist for effecting repair and/or where the repair site is difficult to access.

The quality standards and accuracy to be achieved are as set down in the work specifications.

Learning Outcome and Assessment Criteria

Learning outcomes The learner will:	Assessment criteria The learner can:
1. Know how to interpret engineering drawings and their related specifications	1.1. Describe engineering drawings and their related specifications, including technical drawings
2. Know how to determine the feasibility of repair	2.1. Explain how to assess the condition of components for re-use 2.2. Explain how to determine the feasibility and viability of repairs 2.3. Describe component replacement methods and techniques
3. Know how to follow organisational policies and procedures	3.1. Explain own responsibilities in respect of health, safety and environment, including the limits of personal responsibility, legal responsibility for own health and safety and the health and safety of others 3.2. Explain the relevant regulations and safe working practices and procedures required within own work area 3.3. Identify own responsibilities with regard to the reporting lines and procedures in the working environment

UNIT M3.09c	DETERMINE THE FEASIBILITY OF REPAIR OF COMPONENTS FROM MECHANICAL PLANT AND EQUIPMENT
LEVEL	3
CREDIT VALUE	3
GUIDED LEARNING HOURS	6

Unit Overview

This unit addresses the skills required to determine the feasibility of repair of components from mechanical plant and equipment.

Assessment Guidance and Evidence Requirements

Evidence Requirements

The learner should:

- Provide evidence for at least three instances of determining the feasibility of repair of components
- Provide organisational records

Assessment Guidance

- The use of simulation is not acceptable in the assessment of this unit.
- Workplace performance evidence is mandatory.
- This unit is subject to the requirements set out in the Cogent Assessment Strategy.
- This unit should not be taken prior to taking “Unit M3.09k - How to Determine the Feasibility of Repair of Components from Mechanical Plant and Equipment.”
- The assumption is made that the learner undertaking this unit will be an experienced operator/technician seeking recognition of their competence.

Competent performance must be demonstrated consistently and supported by evidence from a variety of sources. Evidence should be provided to cover areas of the assessment context relevant to the learner’s workplace.

Information on use of Assessment Context

This unit is about the learner’s competence in establishing deviation from the required tolerances and what action to take to bring the component back into service. The learner will be following the organisations safe working practices and working within the work permit procedures.

During this work the learner must take account of the relevant worksite operational requirements, procedures and safe working practices AS THEY APPLY TO THE LEARNER.

The level and extent of responsibility will involve the learner being responsible for ensuring that the equipment and work site is safe for others or self to work in by following company defined procedures. The learner will be accountable for the integrity of the work site and ensuring the work is recorded in a formal manner. Authorisation for proceeding with the work will be given by authorised signatories within the permit to work system.

The engineering drawings and related specifications could include:

- Component
- Assembly
- General arrangements
- Isometrics
- 1st and 3rd angle projections

- Method statements
- Product worksheets
- Tolerances

The type of components to be repaired may be robust or fragile. Robust components are those which are resistant to most forms of damage or disruption during their working lives. Fragile components are those which are easily disrupted or damaged. Damage or disruption could be due to physical, chemical or other forces (e.g. Electro-magnetic).

Typical robust components could be:

- Components of power/lighting transmission
- Motors/components of motors
- Components of electrical back-up systems
- Heat exchangers
- Components of process control systems

Typical fragile components could be:

- Components of electrical circuit protectors
- Electrical metering devices
- Circuit boards
- Safety/protection devices
- Components of electrical panels

Assessing conditions of components for re-use and determining the feasibility and viability of repairs could be expected to include mechanical integrity.

Component replacement methods and techniques could be expected to include manufacturer's data and sources of information.

The type of repair to be made requires one or more techniques to be applied depending upon its complexity. The techniques are standard within the sector but may require some modification to achieve the required result. The techniques may relate to one or more technologies depending upon the complexity of the repair.

Typical repair techniques could include:

- Re-aligning
- Re-shaping by material removal
- Re-soldering
- Bonding
- Replacing

The nature of repairs to be carried out should be complex. Complex repairs are those which can only be achieved using tools and techniques which have been specially modified in some way to achieve the repair and/or where no pre-defined procedures exist for effecting repair and/or where the repair site is difficult to access.

The quality standards and accuracy to be achieved are as set down in the work specifications.

Learning Outcome and Assessment Criteria

Learning outcomes The learner will:	Assessment criteria The learner can:
1. Be able to determine the feasibility of repair of components	1.1. Follow the relevant repair specifications 1.2. Assess the amount and level of wear or damage to the component and determine what work is required to bring the component back to the specified condition 1.3. Report on findings and conclusions on the feasibility and cost-effectiveness of repairs
2. Be able to work safely at all times	2.1. Work safely at all times, complying with health and safety and other relevant regulations and guidelines

OPTIONAL UNITS - GROUP 2

UNIT M3.10K	HOW TO INTERPRET DETAILED MECHANICAL INFORMATION FROM TECHNICAL SOURCES
LEVEL	2
CREDIT VALUE	2
GUIDED LEARNING HOURS	18

Unit Overview

This unit addresses the knowledge required to interpret detailed mechanical information from technical sources.

Assessment Guidance and Evidence Requirements

The learner should provide evidence to meet all the required knowledge and understanding within this unit. This could be provided through different types of evidence and assessment methods, for example learner statements, questioning and professional discussion which should be recorded for verification.

- This unit is subject to the requirements set out in the Cogent Assessment Strategy.
- The assumption is made that the learner undertaking this unit will be an experienced operator/technician seeking recognition of their knowledge.

Information on use of Assessment Context

This unit is about the learner's knowledge of interpreting information from drawings, diagrams and technical manuals. The learner will be required to ensure the information is accurate, up to date and contains all the data. The learner will also be required to identify and deal with problems that may arise. The learner will be following the organisations safe working practices and working within the work permit procedures.

During this work the learner must take account of the relevant worksite operational requirements, procedures and safe working practices AS THEY APPLY TO THE LEARNER.

The level and extent of responsibility will involve the learner being responsible for ensuring that the source information is obtained from the latest version. In some cases the learner may be expected to refer to others when checking the data even though they remain responsible for the final product.

The complexity of technical detail could include:

- Pneumatic schematics
- Piping and instrumentation diagrams (P&ID's)
- Hydraulic schematics

The technical problems and issues will vary from solving simple single line diagrams to more complex drawings and specifications provided by the manufacturer.

The conventions, symbols and abbreviations used could include:

- British standards
- Codes of practice
- International standards
- Company specific
- Manufacturer specific

Learning Outcome and Assessment Criteria

Learning outcomes The learner will:	Assessment criteria The learner can:
1. Know how to interpret detailed mechanical information from technical sources	1.1. Explain the information and document systems that relate to the maintenance of mechanical plant and equipment 1.2. Describe document care and control procedures in line with the company and manufacturer's procedures 1.3. Explain the specification structure and content 1.4. Describe the conventions, symbols and abbreviations used
2. Know how to follow organisational policies and procedures	2.1. Explain the standards and regulations that relate to the maintenance of mechanical plant and equipment 2.2. Explain own responsibilities with regard to the reporting lines and procedures in the working environment

UNIT M3.10C	INTERPRET DETAILED MECHANICAL INFORMATION FROM TECHNICAL SOURCES
LEVEL	2
CREDIT VALUE	2
GUIDED LEARNING HOURS	6

Unit Overview

This unit addresses the skills required to interpret detailed mechanical information from technical sources.

Assessment Guidance and Evidence Requirements

Evidence Requirements

The learner should:

- Provide evidence for at least three instances of extracting detailed information:
 - Include one example that contains national conventions
 - Deal with at least one type of problem in extracting information
- Provide evidence for at least three instances of producing technical details
 - Include one example that contains national conventions
 - Include one example that is in its final version
- Provide written evidence of the details of the technical requirements
- Provide records of the information sources used
- Demonstrate the recording arrangements that were followed
- Provide any drawings, technical procedure sheets, planning sheets, parts lists and other details that have been generated

Assessment Guidance

- The use of simulation is not acceptable in the assessment of this unit.
- Workplace performance evidence is mandatory.
- This unit is subject to the requirements set out in the Cogent Assessment Strategy.
- This unit should not be taken prior to taking “Unit M3.10k - How to Interpret Detailed Mechanical Information from Technical Sources.”
- The assumption is made that the learner undertaking this unit will be an experienced operator/technician seeking recognition of their competence.

Competent performance must be demonstrated consistently and supported by evidence from a variety of sources. Evidence should be provided to cover areas of the assessment context relevant to the learner’s workplace.

Information on use of Assessment Context

This unit is about the learner’s competence in interpreting information from drawings, diagrams and technical manuals. The learner will be required to ensure the information is accurate, up to date and contains all the data. The learner will also be required to identify and deal with problems that may arise. The learner will be following the organisations safe working practices and working within the work permit procedures.

During this work the learner must take account of the relevant worksite operational requirements, procedures and safe working practices AS THEY APPLY TO THE LEARNER.

The level and extent of responsibility will involve the learner being responsible for ensuring that the source information is obtained from the latest version. In some cases the learner may be expected to refer to others when checking the data even though they remain responsible for the final product.

The complexity of technical detail could include:

- Pneumatic schematics
- Piping and instrumentation diagrams (P&ID's)
- Hydraulic schematics

The technical problems and issues will vary from solving simple single line diagrams to more complex drawings and specifications provided by the manufacturer.

The conventions, symbols and abbreviations used could include:

- British standards
- Codes of practice
- International standards
- Company specific
- Manufacturer specific

Learning Outcome and Assessment Criteria

Learning outcomes The learner will:	Assessment criteria The learner can:
1. Be able to interpret detailed mechanical information from technical sources	1.1. Use up-to-date, accurate and relevant information on technical requirements 1.2. Ensure that the information contains all essential data 1.3. Identify and interpret the required details
2. Be able to deal with problems effectively	2.1. Identify and deal promptly and effectively with any problems occurring with the requirements and their interpretation

UNIT M3.11K	HOW TO READ AND EXTRACT INFORMATION FROM MECHANICAL ENGINEERING DRAWINGS AND SPECIFICATIONS
LEVEL	2
CREDIT VALUE	3
GUIDED LEARNING HOURS	26

Unit Overview

This unit addresses the knowledge required to read and extract information from mechanical engineering drawings and specifications.

Assessment Guidance and Evidence Requirements

The learner should provide evidence to meet all the required knowledge and understanding within this unit. This could be provided through different types of evidence and assessment methods, for example learner statements, questioning and professional discussion which should be recorded for verification.

- This unit is subject to the requirements set out in the Cogent Assessment Strategy.
- The assumption is made that the learner undertaking this unit will be an experienced operator/technician seeking recognition of their knowledge.

Information on use of Assessment Context

This unit is about the learner's knowledge of extracting information from technical drawings and publications prior to starting mechanical maintenance work. The learner will be following the organisations safe working practices and working within the work permit procedures.

During this work the learner must take account of the relevant worksite operational requirements, procedures and safe working practices AS THEY APPLY TO THE LEARNER.

The level and extent of responsibility will involve the learner ensuring that the information is sourced from the latest version on the drawings and specifications.

The information to be extracted will relate to the maintenance and repair of plant and equipment.

The currently used types of engineering drawings and specifications could include:

- Schematic diagrams
- As-built drawings
- Manufacturer's specifications
- Piping and Instrumentation Diagrams (P&ID's)

The conventions, symbols and abbreviations used could include:

- British standards
- Codes of practice
- International standards
- Company specific
- Manufacturer specific

Learning Outcome and Assessment Criteria

Learning outcomes The learner will:	Assessment criteria The learner can:
1. Know how to read and extract information from mechanical engineering drawings and specifications	1.1. Describe the information and document systems that relate to the maintenance of plant and equipment 1.2. Explain the currently used types of engineering drawings and specifications 1.3. Explain the conventions, symbols and abbreviations used within the company 1.4. Identify the sources of information available 1.5. Explain the identification and selection of data to ensure that the data is current and relevant to the location
2. Know how to follow organisational policies and procedures	2.1. Define the document care and control procedures that are specified by the company 2.2. Explain own responsibilities with regard to the reporting lines and procedures in the working environment

UNIT M3.11C	READ AND EXTRACT INFORMATION FROM MECHANICAL ENGINEERING DRAWINGS AND SPECIFICATIONS
LEVEL	2
CREDIT VALUE	3
GUIDED LEARNING HOURS	6

Unit Overview

This unit addresses the skills required to read and extract information from mechanical engineering drawings and specifications.

Assessment Guidance and Evidence Requirements

Evidence Requirements

The learner should:

- Provide evidence for at least three instances of extracting detailed information:
 - Include examples of two types of technical requirements (one of which must be a specification)
 - Include one example that contains national conventions
 - Deal with at least one type of problem in extracting information
- Provide evidence for at least three instances of producing technical details
 - Include one example that contains national conventions
 - Include one example that is in its final version
- Provide written evidence of the details of the technical requirements
- Provide records of the information sources used
- Demonstrate the recording arrangements that were followed
- Provide any drawings, technical procedures sheets, planning sheets, parts lists and other details that have been generated.

Assessment Guidance

- The use of simulation is not acceptable in the assessment of this unit.
- Workplace performance evidence is mandatory.
- This unit is subject to the requirements set out in the Cogent Assessment Strategy.
- This unit should not be taken prior to taking “Unit M3.11k - How to Read and Extract Information from Mechanical Engineering Drawings and Specifications.”
- The assumption is made that the learner undertaking this unit will be an experienced operator/technician seeking recognition of their competence.

Competent performance must be demonstrated consistently and supported by evidence from a variety of sources. Evidence should be provided to cover areas of the assessment context relevant to the learner's workplace.

Information on use of Assessment Context

This unit is about the learner's competence in extracting information from technical drawings and publications prior to starting mechanical maintenance work. The learner will be following the organisations safe working practices and working within the work permit procedures.

During this work the learner must take account of the relevant worksite operational requirements, procedures and safe working practices **AS THEY APPLY TO THE LEARNER**.

The level and extent of responsibility will involve the learner ensuring that the information is sourced from the latest version on the drawings and specifications.

The information to be extracted will relate to the maintenance and repair of plant and equipment.

The currently used types of engineering drawings and specifications could include:

- Schematic diagrams
- As-built drawings
- Manufacturer's specifications
- Piping and Instrumentation Diagrams (P&ID's)

The conventions, symbols and abbreviations used could include:

- British standards
- Codes of practice
- International standards
- Company specific
- Manufacturer specific

Learning Outcome and Assessment Criteria

Learning outcomes The learner will:	Assessment criteria The learner can:
1. Be able to interpret and use detailed mechanical information	1.1. Use the approved source to obtain the required drawings and specifications 1.2. Correctly interpret the drawings and specifications 1.3. Identify, extract and interpret the required information 1.4. Use the information obtained to ensure that work output meets the specification
2. Be able to deal with problems and inaccuracies effectively	2.1. Identify and deal promptly and effectively with any problems within own control and report those which cannot be solved 2.2. Report any inaccuracies or discrepancies in drawings and specification

UNIT M3.12K	HOW TO IDENTIFY AND SUGGEST IMPROVEMENTS TO WORKING PRACTICES AND PROCEDURES WHILST MAINTAINING MECHANICAL PLANT AND EQUIPMENT
LEVEL	2
CREDIT VALUE	2
GUIDED LEARNING HOURS	18

Unit Overview

This unit addresses the knowledge required to identify and suggest improvements to working practices and procedures whilst maintaining mechanical plant and equipment.

Assessment Guidance and Evidence Requirements

The learner should provide evidence to meet all the required knowledge and understanding within this unit. This could be provided through different types of evidence and assessment methods, for example learner statements, questioning and professional discussion which should be recorded for verification.

- This unit is subject to the requirements set out in the Cogent Assessment Strategy.
- The assumption is made that the learner undertaking this unit will be an experienced operator/technician seeking recognition of their knowledge.

Information on use of Assessment Context

This unit is about the learner's knowledge of identifying and suggesting improvements. The learner will be required to collect and assess information on current practices and suggest opportunities for improvement by following agreed company procedures.

During this work the learner must take account of the relevant worksite operational requirements, procedures and safe working practices AS THEY APPLY TO THE LEARNER.

The complexity of activities will be those processes and systems on which the maintenance activities are being conducted.

The type and range of improvements to be identified will involve the changes to existing procedures and processes covering safety, quality, time and cost.

Sources of information available could include:

- Company records
- Company procedures
- Clients
- Personal experience
- Tool box talks

The methods for identifying improvements may include use of senses, discussions at tool box talks and own work practices.

The presentation techniques will be in line with company procedures.

Learning Outcome and Assessment Criteria

Learning outcomes The learner will:	Assessment criteria The learner can:
1. Know how to collect and assess information on current practices and procedures	1.1. Explain the sources of information available 1.2. Describe how to present suggestions for improvement
2. Know how to suggest opportunities for improvement	2.1. Explain the work improvement methods and techniques that are set by the company 2.2. Describe the organisational structure, improvement systems and procedures that are set by the company 2.3. Identify the working relationships taking account of the organisation structure, the individuals and any external influences
3. Know how to follow organisational policies and procedures	3.1. Explain own responsibilities in respect of health, safety and environment, including the limits of personal responsibility, legal responsibility for own health and safety and the health and safety of others 3.2. Explain the relevant regulations and safe working practices and procedures required within own work area 3.3. Identify own responsibilities with regard to the reporting lines and procedures in the working environment

UNIT M3.12C	IDENTIFY AND SUGGEST IMPROVEMENTS TO WORKING PRACTICES AND PROCEDURES WHILST MAINTAINING MECHANICAL PLANT AND EQUIPMENT
LEVEL	3
CREDIT VALUE	4
GUIDED LEARNING HOURS	8

Unit Overview

This unit addresses the skills required to identify and suggest improvements to working practices and procedures whilst maintaining mechanical plant and equipment.

Assessment Guidance and Evidence Requirements

Evidence Requirements

The learner should:

- Provide evidence for at least three instances of identifying improvements in working practices:
 - Including at least one type of standard
 - Including the use of at least one type of information source
 - Including taking part in at least one type of discussions
 - Including making at least one type of proposal (e.g. formal)
- Show the information obtained on improvements
- Demonstrate inputs into discussions
- Show formal reports
- Provide organisational records

Assessment Guidance

- The use of simulation is not acceptable in the assessment of this unit.
- Workplace performance evidence is mandatory.
- This unit is subject to the requirements set out in the Cogent Assessment Strategy.
- This unit should not be taken prior to taking “Unit M3.12k - How to Identify and Suggest Improvements to Working Practices and Procedures whilst Maintaining Mechanical Plant and Equipment.”
- The assumption is made that the learner undertaking this unit will be an experienced operator/technician seeking recognition of their competence.

Competent performance must be demonstrated consistently and supported by evidence from a variety of sources. Evidence should be provided to cover areas of the assessment context relevant to the learner’s workplace.

Information on use of Assessment Context

This unit is about the learner’s competence in identifying and suggesting improvements. The learner will be required to collect and assess information on current practices and suggest opportunities for improvement by following agreed company procedures.

During this work the learner must take account of the relevant worksite operational requirements, procedures and safe working practices AS THEY APPLY TO THE LEARNER.

The complexity of activities will be those processes and systems on which the maintenance activities are being conducted.

The type and range of improvements to be identified will involve the changes to existing procedures and processes covering safety, quality, time and cost.

Sources of information available could include:

- Company records
- Company procedures
- Clients
- Personal experience
- Tool box talks

The methods for identifying improvements may include use of senses, discussions at tool box talks and own work practices.

The presentation techniques will be in line with company procedures.

Learning Outcome and Assessment Criteria

Learning outcomes The learner will:	Assessment criteria The learner can:
1. Be able to collect and assess information on current practices and procedures	1.1. Collect information and feedback on current working practices and procedures 1.2. Assess current working practices and procedures against agreed standards
2. Be able to suggest opportunities for improvement	2.1. Identify opportunities for improving working practices and procedures 2.2. Make suggestions for improvements that are realistic and which indicate the benefits that might be achieved 2.3. Ensure that suggested improvements meet organisational requirements 2.4. Present suggestions for improvements in accordance with organisational procedures 2.5. Contribute to discussions about work practices and quality
3. Be able to work safely at all times	3.1. Work safely at all times, complying with health and safety and other relevant regulations and guidelines

UNIT M3.13K	HOW TO ESTABLISH THAT A MECHANICAL ENGINEERING MAINTENANCE PROCESS HAS BEEN COMPLETED TO SPECIFICATION
LEVEL	3
CREDIT VALUE	3
GUIDED LEARNING HOURS	26

Unit Overview

This unit addresses the knowledge required to establish that a mechanical engineering maintenance process has been completed to specification.

Assessment Guidance and Evidence Requirements

The learner should provide evidence to meet all the required knowledge and understanding within this unit. This could be provided through different types of evidence and assessment methods, for example learner statements, questioning and professional discussion which should be recorded for verification.

- This unit is subject to the requirements set out in the Cogent Assessment Strategy.
- The assumption is made that the learner undertaking this unit will be an experienced operator/technician seeking recognition of their knowledge.

Information on use of Assessment Context

This unit is about the learner's knowledge of ensuring that the work has been completed to company and or manufacturer's standards.

During this work the learner must take account of the relevant worksite operational requirements, procedures and safe working practices AS THEY APPLY TO THE LEARNER.

The level and extent of responsibility extends to dismantling the asset to a specified degree but the learner may alter and/or vary the sequence of actions and techniques followed at their discretion to achieve the best possible result in the conditions applying. In some cases, the learner may still be expected to refer to others for final authorisation, even though they remain responsible for identifying and implementing decisions.

The engineering drawings and related specifications could include:

- Component
- Assembly
- General arrangements
- Isometrics
- 1st and 3rd angle projections
- Method statements
- Product worksheets
- Tolerances

The types of products/assets to be checked include mechanical plant and equipment related to engineering maintenance work. This would include:

- Engines
- Transmission systems
- Power transmission systems
- Turbines
- Mechanical/hydraulic systems/actuators
- Fluid/gas transmission systems

Adequate checks of compliance against criteria could be expected to include ex-equipment and data sheets, commissioning procedures, manufacturer's data and local procedures.

Identification of defects in plant and equipment should include what the typical defects and variations are that arise and how to identify them.

Equipment care and control procedures could be expected to include:

- Ingress protection ratings
- Explosion protection rating equipment
- Corrosion
- Portable appliance testing
- Heating and ventilation
- Permit systems

The inspection, test and record-keeping procedures to be followed are as set out in internal Quality Assurance (QA) and Quality Control (QC) procedures.

The aspects, characteristics and complexity of checks to be made are as set down in manufacturer's guidelines and procedures and will include ensuring compliance with relevant international standards. The type of checks made will depend on the engineering process carried out which may include:

- Dismantling
- Assembly
- Positioning and Installation
- Repair of components
- Removal and replacement of components
- Adjustment
- Planned maintenance activities testing

The quality standards and accuracy are as set down in work specifications.

Learning Outcome and Assessment Criteria

Learning outcomes The learner will:	Assessment criteria The learner can:
1. Know how to interpret engineering drawings and their related specifications	1.1. Describe engineering drawings and their related specifications, including technical drawings
2. Know how to carry out equipment checks correctly	2.1. Explain how to make an adequate check of compliance against criteria 2.2. Describe the inspection of equipment care and control procedures including own responsibilities for ensuring the security of tools and equipment that are used
3. Know how to identify and deal with defects and variations	3.1. Explain how to identify defects in plant and equipment 3.2. Identify how defects and variations should be dealt with and what factors determine the actions to be taken
4. Know how to identify documentation procedures and maintain records accurately	4.1. Identify quality control systems and documentation procedures 4.2. Explain why it is important to maintain records of the checks made and the assessments that result from those checks 4.3. Describe what information should be entered on those records and where they should be kept
5. Know how to follow organisational policies and procedures	5.1. Explain own responsibilities in respect of health, safety and environment, including the limits of personal responsibility, legal responsibility for own health and safety and the health and safety of others 5.2. Explain the relevant regulations and safe working practices and procedures required within own work area 5.3. Identify own responsibilities with regard to the reporting lines and procedures in the working environment

UNIT M3.13C	ESTABLISH THAT A MECHANICAL ENGINEERING MAINTENANCE PROCESS HAS BEEN COMPLETED TO SPECIFICATION
LEVEL	3
CREDIT VALUE	3
GUIDED LEARNING HOURS	6

Unit Overview

This unit addresses the skills required to establish that a mechanical engineering maintenance process has been completed to specification.

Assessment Guidance and Evidence Requirements

Evidence Requirements

The learner should:

- Provide evidence for at least three instances of inspecting the products/assets:
 - Include at least three types of inspection (e.g. at completion)
- Demonstrate the checking methods that are used
- Provide organisational records

Assessment Guidance

- The use of simulation is not acceptable in the assessment of this unit.
- Workplace performance evidence is mandatory.
- This unit is subject to the requirements set out in the Cogent Assessment Strategy.
- This unit should not be taken prior to taking “Unit M3.13k - How to Establish that a Mechanical Engineering Maintenance Process has been Completed to Specification.”
- The assumption is made that the learner undertaking this unit will be an experienced operator/technician seeking recognition of their competence.

Competent performance must be demonstrated consistently and supported by evidence from a variety of sources. Evidence should be provided to cover areas of the assessment context relevant to the learner’s workplace.

Information on use of Assessment Context

This unit is about the learner’s competence in ensuring that the work has been completed to company and or manufacturer’s standards.

During this work the learner must take account of the relevant worksite operational requirements, procedures and safe working practices AS THEY APPLY TO THE LEARNER.

The level and extent of responsibility extends to dismantling the asset to a specified degree but the learner may alter and/or vary the sequence of actions and techniques followed at their discretion to achieve the best possible result in the conditions applying. In some cases, the learner may still be expected to refer to others for final authorisation, even though they remain responsible for identifying and implementing decisions.

The engineering drawings and related specifications could include:

- Component
- Assembly
- General arrangements
- Isometrics

- 1st and 3rd angle projections
- Method statements
- Product worksheets
- Tolerances

The types of products/assets to be checked include mechanical plant and equipment related to engineering maintenance work. This would include:

- Engines
- Transmission systems
- Power transmission systems
- Turbines
- Mechanical/hydraulic systems/actuators
- Fluid/gas transmission systems

Adequate checks of compliance against criteria could be expected to include ex-equipment and data sheets, commissioning procedures, manufacturer's data and local procedures.

Identification of defects in plant and equipment should include what the typical defects and variations are that arise and how to identify them.

Equipment care and control procedures could be expected to include:

- Ingress protection ratings
- Explosion protection rating equipment
- Corrosion
- Portable appliance testing
- Heating and ventilation
- Permit systems

The inspection, test and record-keeping procedures to be followed are as set out in internal Quality Assurance (QA) and Quality Control (QC) procedures.

The aspects, characteristics and complexity of checks to be made are as set down in manufacturer's guidelines and procedures and will include ensuring compliance with relevant international standards. The type of checks made will depend on the engineering process carried out which may include:

- Dismantling
- Assembly
- Positioning and Installation
- Repair of components
- Removal and replacement of components
- Adjustment
- Planned maintenance activities testing

The quality standards and accuracy are as set down in work specifications.

Learning Outcome and Assessment Criteria

Learning outcomes The learner will:	Assessment criteria The learner can:
1. Be able to carry out equipment checks correctly	1.1. Follow and make appropriate use of the specifications for the product or asset being checked 1.2. Use all the correct tools and inspection equipment and check that they are in a useable condition 1.3. Carry out the checks in an appropriate sequence using approved methods and procedures
2. Be able to assess defects and report completion	2.1. Identify and assess any defects or variations from the specification and take appropriate action 2.2. Report completion of compliance activities in line with organisational procedures
3. Be able to work safely at all times	3.1. Work safely at all times, complying with health and safety and other relevant regulations and guidelines

UNIT M3.14K	HOW TO TEST THE PERFORMANCE AND CONDITION OF MECHANICAL PLANT AND EQUIPMENT
LEVEL	3
CREDIT VALUE	3
GUIDED LEARNING HOURS	26

Unit Overview

This unit addresses the knowledge required to test the performance and condition of mechanical plant and equipment.

Assessment Guidance and Evidence Requirements

The learner should provide evidence to meet all the required knowledge and understanding within this unit. This could be provided through different types of evidence and assessment methods, for example learner statements, questioning and professional discussion which should be recorded for verification.

- This unit is subject to the requirements set out in the Cogent Assessment Strategy.
- The assumption is made that the learner undertaking this unit will be an experienced operator/technician seeking recognition of their knowledge.

Information on use of Assessment Context

This unit is about the learner's knowledge of testing mechanical plant and equipment. The learner will be expected to refer to manufacturer's manuals and follow the company procedures.

During this work the learner must take account of the relevant worksite operational procedures and safe working practices AS THEY APPLY TO THE LEARNER.

The level and extent of responsibility is limited to working within a detailed specification and following clearly defined procedures. In some cases, the learner may still be expected to refer to others for final authorisation, even though they remain responsible for identifying and implementing decisions.

The typical plant and equipment which are likely to be tested could include:

- Prime mover
- Fluid distribution systems
- Transmission systems and components

The engineering test specifications could be expected to include the latest manufacturer's data sheets and test specifications for specific equipment.

The calibration of equipment and authorisation procedures should include how to ensure that test equipment is set up and calibrated correctly.

The testing methods and procedures used could be expected to include which tests relate to different aspects of performance and conditions specifications, which procedures are followed in different testing contexts, and what the normal timescales are for conducting tests, including individual company procedures.

The analysis methods and techniques could be expected to include what data is provided from tests and which methods can verify data, why it is important to be sure about the reliability, validity and completeness of data before analysis begins, and which analysis methods and procedures can be applied to test results.

The test reporting documentation and procedures should include what the format is for recording the test procedures and results in line with individual company procedures.

The type of tools and test equipment to be used include:

- Gauge/recorders
- Any test equipment as required (must be within calibration)

The type and complexity of tests to be carried out are clearly defined and are appropriate for the engineering product. Detailed procedures and specifications define the set up and conduct of the tests and the interpretation of test results. The testing and analytical techniques/procedures to be followed are clearly defined and, although they may involve more than one stage, full details on when and how to proceed through the stages are available.

The quality standards and accuracy to be achieved are as set down in the work specifications.

Learning Outcome and Assessment Criteria

Learning outcomes The learner will:	Assessment criteria The learner can:
1. Know the different types of test methods and equipment	1.1. Explain the engineering test specifications 1.2. Identify different types of test equipment and their applications 1.3. Describe the calibration of equipment and authorisation procedures 1.4. Explain appropriate testing methods and procedures
2. Know how to test equipment correctly	2.1. Describe the analysis methods and techniques 2.2. Identify the environmental controls relating to testing, including company Health and Safety Executive (HSE) policy 2.3. Explain the test reporting documentation and procedures
3. Know how to follow organisational policies and procedures	3.1. Explain own responsibilities in respect of health, safety and environment, including the limits of personal responsibility, legal responsibility for own health and safety and the health and safety of others 3.2. Explain the relevant regulations and safe working practices and procedures required within own work area 3.3. Identify own responsibilities with regard to the reporting lines and procedures in the working environment

UNIT M3.14C	TEST THE PERFORMANCE AND CONDITION OF MECHANICAL PLANT AND EQUIPMENT
LEVEL	3
CREDIT VALUE	3
GUIDED LEARNING HOURS	6

Unit Overview

This unit addresses the skills required to test the performance and condition of mechanical plant and equipment.

Assessment Guidance and Evidence Requirements

Evidence Requirements

The learner should:

- Provide evidence for at least three instances of testing products/assets:
 - Including at least two types of test
 - Including at least one type of test in either a standard environment or in a non-operational condition
- Demonstrate the tests being conducted
- Show how to test for intermittent faults
- Provide test reports and records

Assessment Guidance

- The use of simulation is not acceptable in the assessment of this unit.
- Workplace performance evidence is mandatory.
- This unit is subject to the requirements set out in the Cogent Assessment Strategy.
- This unit should not be taken prior to taking “Unit M3.14k - How to Test the Performance and Condition of Mechanical Plant and Equipment.”
- The assumption is made that the learner undertaking this unit will be an experienced operator/technician seeking recognition of their competence.

Competent performance must be demonstrated consistently and supported by evidence from a variety of sources. Evidence should be provided to cover areas of the assessment context relevant to the learner’s workplace.

Information on use of Assessment Context

This unit is about the learner’s competence in testing mechanical plant and equipment. The learner will be expected to refer to manufacturer’s manuals and follow the company procedures.

During this work the learner must take account of the relevant worksite operational procedures and safe working practices AS THEY APPLY TO THE LEARNER.

The level and extent of responsibility is limited to working within a detailed specification and following clearly defined procedures. In some cases, the learner may still be expected to refer to others for final authorisation, even though they remain responsible for identifying and implementing decisions.

The typical plant and equipment which are likely to be tested could include:

- Prime mover
- Fluid distribution systems
- Transmission systems and components

The engineering test specifications could be expected to include the latest manufacturer's data sheets and test specifications for specific equipment.

The calibration of equipment and authorisation procedures should include how to ensure that test equipment is set up and calibrated correctly.

The testing methods and procedures used could be expected to include which tests relate to different aspects of performance and conditions specifications, which procedures are followed in different testing contexts, and what the normal timescales are for conducting tests, including individual company procedures.

The analysis methods and techniques could be expected to include what data is provided from tests and which methods can verify data, why it is important to be sure about the reliability, validity and completeness of data before analysis begins, and which analysis methods and procedures can be applied to test results.

The test reporting documentation and procedures should include what the format is for recording the test procedures and results in line with individual company procedures.

The type of tools and test equipment to be used include:

- Gauge/recorders
- Any test equipment as required (must be within calibration)

The type and complexity of tests to be carried out are clearly defined and are appropriate for the engineering product. Detailed procedures and specifications define the set up and conduct of the tests and the interpretation of test results. The testing and analytical techniques/procedures to be followed are clearly defined and, although they may involve more than one stage, full details on when and how to proceed through the stages are available.

The quality standards and accuracy to be achieved are as set down in the work specifications.

Learning Outcome and Assessment Criteria

Learning outcomes The learner will:	Assessment criteria The learner can:
1. Be able to test the performance and condition of mechanical plant and equipment	1.1. Follow the appropriate procedures for use of tools and equipment to carry out the required tests 1.2. Set up and carry out the tests using the correct procedures and within agreed timescales 1.3. Record the results of the tests in the appropriate format 1.4. Review the results and carry out further tests if necessary
2. Be able to work safely at all times	2.1. Work safely at all times, complying with health and safety and other relevant regulations and guidelines

UNIT M3.15k	HOW TO MONITOR THE PERFORMANCE AND CONDITION OF MECHANICAL PLANT AND EQUIPMENT
LEVEL	3
CREDIT VALUE	4
GUIDED LEARNING HOURS	32

Unit Overview

This unit addresses the knowledge required to monitor the performance and condition of mechanical plant and equipment.

Assessment Guidance and Evidence Requirements

The learner should provide evidence to meet all the required knowledge and understanding within this unit. This could be provided through different types of evidence and assessment methods, for example learner statements, questioning and professional discussion which should be recorded for verification.

- This unit is subject to the requirements set out in the Cogent Assessment Strategy.
- The assumption is made that the learner undertaking this unit will be an experienced operator/technician seeking recognition of their knowledge.

Information on use of Assessment Context

This unit is about the learner's knowledge of completing performance and condition monitoring on operational and static mechanical plant and equipment. The learner will be required to set-up, monitor and record the results in accordance with company procedures. The learner will be following the organisations safe working practices at all times and working within the work permit procedures.

During this work the learner must take account of the relevant worksite operational procedures and safe working practices AS THEY APPLY TO THE LEARNER.

The level and extent of responsibility extends to selecting and modifying methods at the learner's discretion to optimise the effectiveness of the monitoring and assessment undertaken in the conditions applying. In some cases, the learner may still be expected to refer to others for final authorisation, even though they remain responsible for identifying and implementing decisions.

The type of assets to be monitored involve multiple technologies or are of a single technology interacting with other plant and equipment in a dynamic manner and could include:

- Prime mover
- Distribution systems
- Transmission systems and components

The performance requirements of plant and equipment could be expected to include manufacturer's and company specifications on performance requirements.

The monitoring methods and equipment to be used may need to be customised to suit the conditions applying.

Typical monitoring methods could include:

- Analysing trends
- Investigating abnormal characteristics
- Researching historical data
- Analysing/reviewing outputs
- Comparison against norm

The monitoring conditions or operating environment may be normal operating environments which are complex by virtue of access problems and/or the likelihood of disruption to the monitoring process. Conditions may also be abnormal as a result of unusual hazards being present or non-standard demands placed on the operation of the assets.

The complexity of monitoring to be carried out would include motor tests as advised by company procedures, including:

- Temperature monitoring
- Vibration monitoring
- Current readings
- Run down and up time

Learning Outcome and Assessment Criteria

Learning outcomes The learner will:	Assessment criteria The learner can:
1. Know how to set up and calibrate the equipment for monitoring	1.1. Explain the performance requirements of plant and equipment 1.2. Describe the monitoring methods and procedures for plant and equipment 1.3. Identify which data is required to make decisions 1.4. Explain the importance of the need for equipment calibration and authorisation procedures including ensuring that the monitoring equipment is set up and calibrated correctly
2. Know how to carry out the monitoring activities and record the outcomes	2.1. Explain monitoring equipment settings, operating and care and control procedures 2.2. Describe the formats for recording and monitoring results in line with company procedures 2.3. Describe how to ensure that performance monitoring is carried out to the required standard 2.4. Explain how to optimise the effectiveness of the monitoring and assessment undertaken in the conditions applying
3. Know how to identify and minimise disruption during monitoring	3.1. Identify the types of disruption which can occur during monitoring and how to minimise different types of disruption
4. Know how to follow organisational policies and procedures	4.1. Explain own responsibilities in respect of health, safety and environment, including the limits of personal responsibility, legal responsibility for own health and safety and the health and safety of others 4.2. Explain the relevant regulations and safe working practices and procedures required within own work area 4.3. Identify own responsibilities with regard to the reporting lines and procedures in the working environment

UNIT M3.15C	MONITOR THE PERFORMANCE AND CONDITION OF MECHANICAL PLANT AND EQUIPMENT
LEVEL	3
CREDIT VALUE	3
GUIDED LEARNING HOURS	6

Unit Overview

This unit addresses the skills required to monitor the performance and condition of mechanical plant and equipment.

Assessment Guidance and Evidence Requirements

Evidence Requirements

The learner should:

- Provide evidence for at least three instances of monitoring the performance of products/assets
- Demonstrate the monitoring activities being undertaken
- Provide organisational records

Assessment Guidance

- The use of simulation is not acceptable in the assessment of this unit.
- Workplace performance evidence is mandatory.
- This unit is subject to the requirements set out in the Cogent Assessment Strategy.
- This unit should not be taken prior to taking “Unit M3.15k - How to Monitor the Performance and Condition of Mechanical Plant and Equipment.”
- The assumption is made that the learner undertaking this unit will be an experienced operator/technician seeking recognition of their competence.

Competent performance must be demonstrated consistently and supported by evidence from a variety of sources. Evidence should be provided to cover areas of the assessment context relevant to the learner’s workplace.

Information on use of Assessment Context

This unit is about the learner’s competence in completing performance and condition monitoring on operational and static mechanical plant and equipment. The learner will be required to set-up, monitor and record the results in accordance with company procedures. The learner will be following the organisations safe working practices at all times and working within the work permit procedures.

During this work the learner must take account of the relevant worksite operational procedures and safe working practices AS THEY APPLY TO THE LEARNER.

The level and extent of responsibility extends to selecting and modifying methods at the learner’s discretion to optimise the effectiveness of the monitoring and assessment undertaken in the conditions applying. In some cases, the learner may still be expected to refer to others for final authorisation, even though they remain responsible for identifying and implementing decisions.

The type of assets to be monitored involve multiple technologies or are of a single technology interacting with other plant and equipment in a dynamic manner and could include:

- Prime mover
- Distribution systems
- Transmission systems and components

The performance requirements of plant and equipment could be expected to include manufacturer's and company specifications on performance requirements.

The monitoring methods and equipment to be used may need to be customised to suit the conditions applying.

Typical monitoring methods could include:

- Analysing trends
- Investigating abnormal characteristics
- Researching historical data
- Analysing/reviewing outputs
- Comparison against norm

The monitoring conditions or operating environment may be normal operating environments which are complex by virtue of access problems and/or the likelihood of disruption to the monitoring process. Conditions may also be abnormal as a result of unusual hazards being present or non-standard demands placed on the operation of the assets.

The complexity of monitoring to be carried out would include motor tests as advised by company procedures, including:

- Temperature monitoring
- Vibration monitoring
- Current readings
- Run down and up time

Learning Outcome and Assessment Criteria

Learning outcomes	Assessment criteria
The learner will:	The learner can:
1. Be able to set up and calibrate the equipment for monitoring	1.1. Correctly set up and check/calibrate the equipment required for the monitoring being carried out
2. Be able to carry out the monitoring activities and review the outcomes	2.1. Carry out the monitoring activities effectively 2.2. Minimise disruption to normal activities 2.3. Record and review the outcomes and take appropriate actions 2.4. Ensure that performance monitoring is carried out to the required standard 2.5. Optimise the effectiveness of the monitoring and assessment undertaken in the conditions applying
3. Be able to work safely at all times	3.1. Work safely at all times, complying with health and safety and other relevant regulations and guidelines

UNIT M3.16K	HOW TO ASSESS THE PERFORMANCE AND CONDITION OF MECHANICAL PLANT AND EQUIPMENT
LEVEL	3
CREDIT VALUE	4
GUIDED LEARNING HOURS	32

Unit Overview

This unit addresses the knowledge required to assess the performance and condition of mechanical plant and equipment.

Assessment Guidance and Evidence Requirements

The learner should provide evidence to meet all the required knowledge and understanding within this unit. This could be provided through different types of evidence and assessment methods, for example learner statements, questioning and professional discussion which should be recorded for verification.

- This unit is subject to the requirements set out in the Cogent Assessment Strategy.
- The assumption is made that the learner undertaking this unit will be an experienced operator/technician seeking recognition of their knowledge.

Information on use of Assessment Context

This unit is about the learner's knowledge of assessing the performance and condition of mechanical plant and equipment using all available sources of information. The learner will be required to check that they have all the necessary data, complete the assessment and analyse the results by comparing with norms and previous records. To record the results the learner will follow company procedures and the organisations safe working practices at all times and work within the work permit procedures.

During this work the learner must take account of the relevant worksite operational procedures and safe working practices AS THEY APPLY TO THE LEARNER.

The level and extent of responsibility extends to selecting and modifying methods at the learner's discretion to optimise the effectiveness of the monitoring and assessment undertaken in the conditions applying. In some cases, the learner may still be expected to refer to others for final authorisation, even though they remain responsible for identifying and implementing decisions.

The type of assets to be assessed involve multiple technologies or are of a single technology interacting with other plant and equipment in a dynamic manner and could include:

- Prime mover
- Distribution systems
- Transmission systems and components

The type of data to be analysed covers:

- Vibration
- Temperature
- Current
- Voltage

The analysis methods to be used covers:

- Comparison to manufacturer's specification
- Historical
- Maintenance records
- Trend analysis

The complexity of monitoring information to be used could include motor, plant or equipment tests as advised by company procedures. The information gained will vary in complexity and depend on the assessment being carried out. The information gathered will be used in various ways as dictated by the test or company procedures.

Learning Outcome and Assessment Criteria

Learning outcomes The learner will:	Assessment criteria The learner can:
1. Know how to explain and identify test specifications and monitoring methods	1.1. Explain equipment operating and test specifications including manufacturer's and company specifications 1.2. Identify equipment monitoring methods and procedures including the types of data provided from monitoring, which methods can verify data and why it is important to do so
2. Know how to assess and report the results	2.1. Describe the assessment methods and techniques for specific data, plant and equipment 2.2. Identify the factors which have to be taken into account when assessing performance of specific plant and equipment 2.3. Explain the reporting documentation and control procedures including how to present results of the assessment, and who should receive the results and implications of assessments
3. Know how to follow organisational policies and procedures	3.1. Explain own responsibilities in respect of health, safety and environment, including the limits of personal responsibility, legal responsibility for own health and safety and the health and safety of others 3.2. Explain the relevant regulations and safe working practices and procedures required within own work area 3.3. Identify own responsibilities with regard to the reporting lines and procedures in the working environment

UNIT M3.16C	ASSESS THE PERFORMANCE AND CONDITION OF MECHANICAL PLANT AND EQUIPMENT
LEVEL	3
CREDIT VALUE	4
GUIDED LEARNING HOURS	6

Unit Overview

This unit addresses the skills required to assess the performance and condition of mechanical plant and equipment.

Assessment Guidance and Evidence Requirements

Evidence Requirements

The learner should:

- Provide evidence for at least three instances of assessing the performance of products/assets
- Demonstrate the assessment activities being undertaken
- Show assessments that have been made
- Provide organisational records

Assessment Guidance

- The use of simulation is not acceptable in the assessment of this unit.
- Workplace performance evidence is mandatory.
- This unit is subject to the requirements set out in the Cogent Assessment Strategy.
- This unit should not be taken prior to taking “Unit M3.16k - How to Assess the Performance and Condition of Mechanical Plant and Equipment.”
- The assumption is made that the learner undertaking this unit will be an experienced operator/technician seeking recognition of their competence.

Competent performance must be demonstrated consistently and supported by evidence from a variety of sources. Evidence should be provided to cover areas of the assessment context relevant to the learner’s workplace.

Information on use of Assessment Context

This unit is about the learner’s competence in assessing the performance and condition of mechanical plant and equipment using all available sources of information. The learner will be required to check that they have all the necessary data, complete the assessment and analyse the results by comparing with norms and previous records. To record the results the learner will follow company procedures and the organisations safe working practices at all times and work within the work permit procedures.

During this work the learner must take account of the relevant worksite operational procedures and safe working practices AS THEY APPLY TO THE LEARNER.

The level and extent of responsibility extends to selecting and modifying methods at the learner’s discretion to optimise the effectiveness of the monitoring and assessment undertaken in the conditions applying. In some cases, the learner may still be expected to refer to others for final authorisation, even though they remain responsible for identifying and implementing decisions.

The type of assets to be assessed involve multiple technologies or are of a single technology interacting with other plant and equipment in a dynamic manner and could include:

- Prime mover
- Distribution systems

- Transmission systems and components

The type of data to be analysed covers:

- Vibration
- Temperature
- Current
- Voltage

The analysis methods to be used covers:

- Comparison to manufacturer's specification
- Historical
- Maintenance records
- Trend analysis

The complexity of monitoring information to be used could include motor, plant or equipment tests as advised by company procedures. The information gained will vary in complexity and depend on the assessment being carried out. The information gathered will be used in various ways as dictated by the test or company procedures.

Learning Outcome and Assessment Criteria

Learning outcomes The learner will:	Assessment criteria The learner can:
1. Be able to set up and carry out the assessment	1.1. Ensure the necessary test data on which to conduct the assessment is obtained 1.2. Carry out the assessment using all relevant data and valid methods 1.3. Check that the assessment provides clear and accurate information
2. Be able to assess and report the results	2.1. Compare current performance and condition data with that from previous assessments 2.2. Identify and report the implications arising from the assessments 2.3. Record the results of the assessments in the appropriate format
3. Be able to work safely at all times	3.1. Work safely at all times, complying with health and safety and other relevant regulations and guidelines

UNIT M3.17k	HOW TO INSPECT MECHANICAL PLANT AND EQUIPMENT
LEVEL	3
CREDIT VALUE	3
GUIDED LEARNING HOURS	26

Unit Overview

This unit addresses the knowledge required to inspect mechanical plant and equipment.

Assessment Guidance and Evidence Requirements

The learner should provide evidence to meet all the required knowledge and understanding within this unit. This could be provided through different types of evidence and assessment methods, for example learner statements, questioning and professional discussion which should be recorded for verification.

- This unit is subject to the requirements set out in the Cogent Assessment Strategy.
- The assumption is made that the learner undertaking this unit will be an experienced operator/technician seeking recognition of their knowledge.

Information on use of Assessment Context

This unit is about the learner's knowledge of completing checks on mechanical plant and equipment. The learner will be required to complete the checks following the company procedures. The checks may be routine or non-routine in nature.

To record the results the learner will follow company procedures and the organisations safe working practices at all times and work within the work permit procedures.

During this work the learner must take account of the relevant worksite operational procedures and safe working practices AS THEY APPLY TO THE LEARNER.

The level and extent of responsibility extends to selecting and modifying methods at the learner's discretion to optimise the effectiveness of the monitoring and assessment undertaken in the conditions applying. In some cases, the learner may still be expected to refer to others for final authorisation, even though they remain responsible for identifying and implementing decisions.

The engineering drawings and related specifications could include:

- Component
- Assembly
- General arrangements
- Isometrics
- 1st and 3rd angle projections
- Method statements
- Product worksheets
- Tolerances

The type of products to be inspected involve multiple technologies or are of a single technology interacting with other assets in a dynamic manner.

Typical plant and equipment could be:

- Rotating equipment and tools
- Protection methods
- Electrical distribution systems

The calibration of equipment care and control procedures that are approved by the company should include the procedure for recertification and how to interpret the calibration certificate.

The inspection equipment care and control procedures that are approved by the company should include storage, both in situ and transit and the checking of calibration certificates.

The identification of defects in products, equipment and systems should include what the typical defects are that arise and how to identify them, typical examples are:

- Weathering
- Wear and tear
- Corrosion

The aspects, characteristics and complexity of checks are as set down in the manufacturer's guidelines and procedures and will include ensuring compliance with relevant international standards, equipment manufacturer specifications, Health and Safety Executive (HSE), company procedure, the Electricity at Work regulations and BS 7671.

The type of checks made will depend on the engineering process carried out which may include:

- Dismantling
- Assembly
- Positioning and installation
- Repair of components
- Removal and replacement of components
- Adjustment
- Planned maintenance activities testing

The inspection methods, techniques and type of equipment to be used are as set out in internal Quality Assurance (QA) and Quality Control (QC) procedures.

The quality standards and accuracy to be achieved are as set down in work specifications.

Learning Outcome and Assessment Criteria

Learning outcomes The learner will:	Assessment criteria The learner can:
1. Know how to interpret engineering drawings and their related specifications	1.1. Describe engineering drawings and their related specifications, including technical drawings
2. Know how to inspect mechanical plant and equipment	2.1. Explain the inspection methods and techniques that are approved by the company 2.2. Describe the calibration of equipment care and control procedures that are approved by the company 2.3. Identify inspection equipment care and control procedures that are approved by the company
3. Know how to identify and deal with defects and variations	3.1. Identify defects in products, equipment and systems 3.2. Explain the quality control systems and documentation procedures 3.3. Describe how defects and variations should be dealt with and what factors determine the actions to be taken
4. Know how to record the results of the inspection correctly	4.1. Explain why it is important to maintain records of the checks made and the assessments that result from those checks 4.2. Identify what information should be entered on those records and where they should be kept
5. Know how to follow organisational policies and procedures	5.1. Explain own responsibilities in respect of health, safety and environment, including the limits of personal responsibility, legal responsibility for own health and safety and the health and safety of others 5.2. Explain the relevant regulations and safe working practices and procedures required within own work area 5.3. Identify own responsibilities with regard to the reporting lines and procedures in the working environment

UNIT M3.17C	INSPECT MECHANICAL PLANT AND EQUIPMENT
LEVEL	3
CREDIT VALUE	3
GUIDED LEARNING HOURS	6

Unit Overview

This unit addresses the skills required to inspect mechanical plant and equipment.

Assessment Guidance and Evidence Requirements

Evidence Requirements

The learner should:

- Provide evidence for at least three instances of inspecting the products/assets
- Demonstrate the checking methods that are used
- Provide organisational records

Assessment Guidance

- The use of simulation is not acceptable in the assessment of this unit.
- Workplace performance evidence is mandatory.
- This unit is subject to the requirements set out in the Cogent Assessment Strategy.
- This unit should not be taken prior to taking “Unit M3.17k - How to Inspect Mechanical Plant and Equipment.”
- The assumption is made that the learner undertaking this unit will be an experienced operator/technician seeking recognition of their competence.

Competent performance must be demonstrated consistently and supported by evidence from a variety of sources. Evidence should be provided to cover areas of the assessment context relevant to the learner's workplace.

Information on use of Assessment Context

This unit is about the learner's competence in completing checks on mechanical plant and equipment. The learner will be required to complete the checks following the company procedures. The checks may be routine or non-routine in nature.

To record the results the learner will follow company procedures and the organisations safe working practices at all times and work within the work permit procedures.

During this work the learner must take account of the relevant worksite operational procedures and safe working practices AS THEY APPLY TO THE LEARNER.

The level and extent of responsibility extends to selecting and modifying methods at the learner's discretion to optimise the effectiveness of the monitoring and assessment undertaken in the conditions applying. In some cases, the learner may still be expected to refer to others for final authorisation, even though they remain responsible for identifying and implementing decisions.

The engineering drawings and related specifications could include:

- Component
- Assembly
- General arrangements
- Isometrics

- 1st and 3rd angle projections
- Method statements
- Product worksheets
- Tolerances

The type of products to be inspected involve multiple technologies or are of a single technology interacting with other assets in a dynamic manner.

Typical plant and equipment could be:

- Rotating equipment and tools
- Protection methods
- Electrical distribution systems

The calibration of equipment care and control procedures that are approved by the company should include the procedure for recertification and how to interpret the calibration certificate.

The inspection equipment care and control procedures that are approved by the company should include storage, both in situ and transit and the checking of calibration certificates.

The identification of defects in products, equipment and systems should include what the typical defects are that arise and how to identify them, typical examples are:

- Weathering
- Wear and tear
- Corrosion

The aspects, characteristics and complexity of checks are as set down in the manufacturer's guidelines and procedures and will include ensuring compliance with relevant international standards, equipment manufacturer specifications, Health and Safety Executive (HSE), company procedure, the Electricity at Work regulations and BS 7671.

The type of checks made will depend on the engineering process carried out which may include:

- Dismantling
- Assembly
- Positioning and installation
- Repair of components
- Removal and replacement of components
- Adjustment
- Planned maintenance activities testing

The inspection methods, techniques and type of equipment to be used are as set out in internal Quality Assurance (QA) and Quality Control (QC) procedures.

The quality standards and accuracy to be achieved are as set down in work specifications.

Learning Outcome and Assessment Criteria

Learning outcomes The learner will:	Assessment criteria The learner can:
1. Be able to inspect mechanical plant and equipment	1.1. Follow the correct specification for the product/equipment being inspected 1.2. Use the correct equipment to carry out the inspection 1.3. Identify and confirm the inspection checks to be made and acceptance criteria to be used 1.4. Carry out all required inspections as specified
2. Be able to record the results of the inspection correctly	2.1. Record the results of the inspection in the appropriate format
3. Be able to identify defects and deal with problems promptly	3.1. Identify any defects or variations from the specification 3.2. Deal promptly and effectively with problems within own control and report those that cannot be solved
4. Be able to work safely at all times	4.1. Work safely at all times, complying with health and safety and other relevant regulations and guidelines