GQA PAA\VQSET Level 2 NVQ Diploma in Performing Engineering Operations

601/1785/0

Centre Qualification Handbook
MANDATORY UNITS ONLY
(REQUEST OPTIONAL UNITS FROM GQA)

Competence-based Qualifications

August 2021 v1

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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 GQA 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 2 NVQ DIPLOMA IN PERFORMING ENGINEERING OPERATIONS

Qualification Summary

This qualification is intended for learners who are undertaking an engineering apprenticeship or are new entrants to the engineering sector and wish to develop a broad range of engineering competencies to enable safe progression into the workplace/employment. It will also benefit learners who are already in employment but require additional engineering competencies as part of an existing job role or to enable career progression which involves the application of skills, knowledge and understanding in a range of work activities often performed in a variety of contexts.

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 214

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 400

Achieving the Qualification

Learners may achieve one of the following pathways: Engineering Practices or Technical Support.

***Engineering Practices Pathway* – 6 Units must be achieved.**

Learners must achieve 3 Mandatory Units and 3 Optional Units (see restrictions below).

***Technical Support Pathway* – 8 Units must be achieved.**

Learners must achieve 3 Mandatory Units and 5 Optional Units; 1 Unit from Option Group 1, 2 Units from Option Group 2 and 2 units from Option Group 3.

Mandatory Units

Unit No.	Unit Name	Credit Value
PEO2-001	Working safely in an engineering environment	5
PEO2-002	Carrying out engineering activities efficiently and effectively	4
PEO2-003	Using and communicating technical information	4

Engineering Practices – Optional Units

Learners must achieve 3 units from this Option Group (see restrictions below):

- Only one unit from 4, 32 and 61 may be taken.
- If unit 65 is selected units 5, 6, 8, 11, 12, 15, 16, 17 may not be taken.
- If unit 66 is selected units 10, 22, 23, 25, 26, 27, 28, 29, 30, 34 may not be taken.
- If unit 67 is selected units 33, 35, 36, 40 may not be taken.
- If unit 68 is selected units 19, 21, 37, 38, 39, 40, 58, 59 may not be taken.

Unit No.	Unit Name	Credit Value
PEO2–004	Producing mechanical engineering drawings using a CAD system	11
PEO2–005	Producing components using hand fitting techniques	14
PEO2-006	Producing mechanical assemblies	15
PEO2-007	Forming and assembling pipework systems	14
PEO2-008	Carrying out aircraft detail fitting activities	14
PEO2-009	Installing aircraft mechanical fasteners	11
PEO2-010	Producing aircraft detail assemblies	14
PEO2-011	Preparing and using lathes for turning operations	15
PEO2-012	Preparing and using milling machines	15
PEO2-013	Preparing and using grinding machines	15
PEO2-014	Preparing and proving CNC machine tool programs	14
PEO2-015	Preparing and using CNC turning machines	14
PEO2-016	Preparing and using CNC milling machines	14
PEO2-017	Preparing and using CNC machining centres	14
PEO2-018	Preparing and using industrial robots	14
PEO2-019	Maintaining mechanical devices and equipment	14
PEO2-020	Assembling and testing fluid power systems	14
PEO2-021	Maintaining fluid power equipment	14
PEO2-022	Producing sheet metal components and assemblies	14
PEO2-023	Producing platework components and assemblies	14
PEO2-024	Cutting and shaping materials using thermal cutting equipment	14
PEO2-025	Preparing and proving CNC fabrication machine tool programs	14
PEO2-026	Preparing and using CNC fabrication machinery	14
PEO2-027	Preparing and using manual metal arc welding equipment	15
PEO2-028	Preparing and using manual TIG or plasma-arc welding equipment	15
PEO2-029	Preparing and using manual MIG, MAG and other continuous wire welding equipment	15
PEO2-030	Preparing and using manual oxy/fuel gas welding equipment	14
PEO2-031	Preparing and using manual flame brazing and braze welding equipment	11
PEO2-032	Producing electrical or electronic engineering drawings using a CAD system	11
PEO2-033	Wiring and testing electrical equipment and circuits	14

PEO2-034	Forming and assembling electrical cable enclosure and support systems	13
PEO2-035	Assembling, wiring and testing electrical panels/components mounted in enclosures	14
PEO2-036	Assembling and testing electronic circuits	14
PEO2-037	Maintaining electrical equipment/systems	15
PEO2-038	Maintaining electronic equipment/systems	15
PEO2-039	Maintaining and testing process instrumentation and control devices	15
PEO2-040	Wiring and testing programmable controller based systems	15
PEO2-041	Using wood for pattern, modelmaking and other engineering applications	15
PEO2-042	Assembling pattern, model and engineering woodwork components	14
PEO2-043	Producing composite mouldings using wet lay-up techniques	14
PEO2-044	Producing composite mouldings using pre-preg techniques	14
PEO2-045	Producing composite mouldings using resin flow infusion techniques	14
PEO2-046	Producing composite assemblies	14
PEO2-047	Producing components by rapid prototyping techniques	11
PEO2-048	Producing and preparing sand moulds and cores for casting	14
PEO2-049	Producing and preparing molten materials for casting	14
PEO2-050	Producing cast components by manual means	13
PEO2-051	Fettling, finishing and checking cast components	11
PEO2-052	Finishing surfaces by applying coatings or coverings	9
PEO2-053	Finishing surfaces by applying treatments	9
PEO2-054	Carrying out heat treatment of engineering materials	9
PEO2-055	Carrying out hand forging of engineering materials	9
PEO2-056	Stripping and rebuilding motorsport vehicles pre-competition	14
PEO2-057	Inspecting a motorsport vehicle during a competition	14
PEO2-058	Diagnosing and rectifying faults on motorsport vehicle systems during competition	15
PEO2-059	Carrying out maintenance activities on motorsport vehicle electrical equipment	15
PEO2-060	Stripping and rebuilding motorsport engines pre-competition	14
PEO2-061	Producing CAD models/drawings using a CAD system	11
PEO2-065	General machining, fitting and assembly applications	12
PEO2-066	General fabrication and welding applications	12
PEO2-067	General electrical and electronic engineering applications	12
PEO2-068	General maintenance engineering applications	12
PEO2-069	Joining Public Service Vehicle Components by Mechanical Processes	11
PEO2-070	Assembling Structural Sub Assemblies to Produce a Public Service Vehicle	14
PEO2-071	Fitting Sub Assemblies and Components to Public Service Vehicles	14
PEO2-072	Preparing and Manoeuvring Armoured Fighting Vehicles AFVs for Maintenance and Transportation	14
PEO2-073	Producing Composite Mouldings using Resin Film Infusion Techniques	14

Technical Support – Optional Units

Option Group 1 **-** Learners must achieve 1 Optional Unit from this Group.

Unit No.	Unit Name	Credit Value
PEO2-004	Producing mechanical engineering drawings using a CAD system	11
PEO2-032	Producing electrical or electronic engineering drawings using a CAD system	11
PEO2-061	Producing CAD models/drawings using a CAD system	11

Option Group 2 **-** Learners must achieve 2 Optional Units from this Group.

Unit No.	Unit Name	Credit Value
PEO2-062	Producing engineering project plans	8
PEO2-063	Using computer software packages to assist with engineering activities	8
PEO2-064	Conducting business improvement activities	8

Option Group 3 **-** Learners must achieve 2 Optional Units from this Group.

Unit No.	Unit Name	Credit Value
PEO2-065	General machining, fitting and assembly applications	12
PEO2-066	General fabrication and welding applications	12
PEO2-067	General electrical and electronic engineering applications	12
PEO2-068	General maintenance engineering applications	12

Progression

This Diploma is part of a suite of qualifications developed from the Performing Engineering Operations National Occupational Standards (NOS) at Levels 1 and 2. It forms part of SEMTA's Engineering Apprenticeship Framework; will lead into employment and also provides progression to other related qualifications at Levels 3 and above.

Further information can be found on the GQA website WWW.GQAQualifications.com 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.

GQA 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

a. 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.

b. 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

c. The qualification or unit specific assessment requirements will define where evidence from simulation is acceptable, and in which contexts. Simulation may be permitted but must be agreed with the EV prior to implementation.

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 GQA. 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 GQA.

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 GQA 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 GQA.

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. GQA'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 GQA 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
Level	An indication of the relative demand, complexity and/or depth of achievement, and/or the autonomy of the learner in demonstrating that achievement

Term	Definition
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 2 NVQ DIPLOMA IN PERFORMING ENGINEERING OPERATIONS

CONTENT OF THE QUALIFICATION

MANDATORY UNITS

UNIT PEO2-001	**WORKING SAFELY IN AN ENGINEERING ENVIRONMENT**
LEVEL	**2**
CREDIT VALUE	**5**
GUIDED LEARNING HOURS	**33**

Unit Overview

This unit covers the skills and knowledge needed to prove the competences required to work safely in an engineering environment. It will prepare the learner for entry into the engineering or manufacturing sectors, creating a progression between education and employment, or it will act as a basis for the development of additional skills and occupational competences in the working environment. It covers carrying out the learner's work activities in accordance with instructions and by the use of safe working practices and procedures.

The learner will be required to comply with all relevant regulations that apply to their area of work, as well as their general responsibilities as defined in the Health and Safety at Work Act. The learner must be able to identify the relevant qualified first aiders or appointed person, and know the location of the first aid facilities. The learner will have an understanding of the procedures to be adopted in the case of accidents involving injury, and in situations where there are dangerous occurrences or hazardous malfunctions of equipment, processes or machinery. The learner will also need to be fully conversant with the organisation's procedures for fire alerts and for the evacuation of premises.

The learner will be required to identify hazardous situations, equipment, materials or conditions, and know how to take appropriate action to eliminate/minimise the risks to life, property and the environment within their immediate work surroundings. As part of hazard control, the learner will be required to recognise the hazards in the engineering environment in which they work, and to have an appreciation of the risk involved with those hazards and the precautions they can take to lower the risk of injury or damage to plant and equipment. Whilst working in the engineering environment, the learner will be required to note and report any changes in the work area or process that may affect their own safety or the safety of others.

The learner will be expected to dress, behave and maintain the workplace in a manner that is acceptable to the organisation in which they work and the type of activities being carried out. This will require the learner to observe all relevant statutory and organisation regulations, and to comply with codes of good practice and safe working procedures at all times.

The learner's responsibilities will require them to comply with organisational policy and procedures for the activities undertaken. The learner will need to take account of any potential difficulties or problems that may arise with the activities, and to seek appropriate help and advice in determining and implementing a suitable solution. The learner will work under a high level of supervision, whilst taking responsibility for their own actions and for the quality and accuracy of the work that they carry out.

The learner's knowledge will provide a good understanding of their work, and will provide an informed approach to working safely in an engineering environment. The learner will understand the safety requirements and their application, to the required depth to provide a sound basis for carrying out their activities safely and correctly.

Assessment Guidance and Evidence Requirements

Evidence Requirements

The Evidence Requirements for this unit are identified in the Assessment Criteria.

Assessment Guidance

- This unit is subject to the requirements of GQA which can be found in the Performing Engineering Operations Qualification Handbook.

Learning Outcome and Assessment Criteria

Learning outcomes **The learner will:**	**Assessment criteria** **The learner can:**
1. Work safely in an engineering environment	1.1. Comply with their duties and obligations as defined in the Health and Safety at Work Act (HASAWA) 1.2. Demonstrate their understanding of their duties and obligations to health and safety by carrying out all of the following: a) applying in principle their duties and responsibilities as an individual under the Health and Safety at Work Act and other relevant current legislation b) identifying, within their working environment, appropriate sources of information and guidance on health and safety issues, to include: • eye protection and personal protective equipment • COSHH regulations • risk assessments c) identifying the warning signs and labels of the main groups of hazardous or dangerous substances d) complying at all times with the appropriate statutory regulations and specific regulations relevant to their work 1.3. Apply safe working practices and procedures at all times 1.4. Apply safe working practices in an engineering environment, to include all of the following: a) present themselves in the workplace suitably dressed/prepared for the activities to be undertaken b) observe personal protection and hygiene procedures at all times c) act in a responsible manner at all times within the working environment d) maintain a tidy workplace, with exits and gangways free from obstructions

	e) use tools and equipment safely and only for the purpose intended f) carry out their work activities in accordance with legal requirements and the organisations safety policies g) take measures to protect others from harm resulting from any work that they are carrying out 1.5. Follow organisational accident and emergency procedures 1.6. Comply with all emergency requirements, to include: a) identifying the appropriate qualified first aiders or appointed person, and the location of first aid facilities b) identifying the procedures to be followed in the event of injury to themselves or others c) following organisational procedures in the event of fire/fire drills and for the evacuation of premises/work area d) identifying and using the procedures to be followed in the event of dangerous occurrences or hazardous malfunctions of equipment, processes or machinery 1.7. Recognise and control hazards in the workplace to minimise risks 1.8. Identify the hazards and risks that are associated with all of the following: a) their working environment (such as working at height, in confined spaces, hot work) b) the tools and equipment that they use (such as machines, power tools, cutting tools) c) materials and substances that they use (such as cutting fluids/oils, hydraulic fluids, fluxes) d) using working practices that do not follow laid-down procedures 1.9. Use correct manual lifting and carrying techniques 1.10. Demonstrate the following methods of manual lifting and carrying techniques: a) lifting alone Plus one more of the following: b) with assistance of others c) with mechanical assistance
2. Know how to work safely in an engineering environment	2.1. Describe the roles and responsibilities of themselves and others under the Health and Safety at Work Act and other current legislation (such as The Management of Health and Safety at Work Regulations; Workplace Health and Safety and Welfare Regulations; Personal Protective Equipment at Work Regulations; Manual Handling Operations Regulations; Provision and Use of Work Equipment Regulations; Display Screen at Work Regulations, Reporting of Injuries, Diseases and Dangerous Occurrences Regulations) 2.2. Describe the specific regulations and safe working practices and procedures that apply to their work activities (such as The Electricity at Work Regulations, Woodworking Regulations)

2.3. Describe the warning signs for the main groups of hazardous substances defined by Classification, Packaging and Labelling of Dangerous Substances Regulations

2.4. Explain how to locate relevant health and safety information for their tasks, and the sources of expert assistance when help is needed

2.5. Explain what constitutes a hazard in the workplace (such as moving parts of machinery, electricity, slippery and uneven surfaces, dust and fumes, handling and transporting, contaminants and irritants, material ejection, fire, working at height, environment, pressure/stored energy systems, volatile or toxic materials, unshielded processes)

2.6. Describe their responsibilities for dealing with hazards and reducing risks in the workplace (such as hazard spotting and safety inspections; the use of hazard check lists, carrying out risk assessments, COSHH assessments and safe systems of working)

2.7. Describe the risks associated with their working environment (such as the tools, materials and equipment that they use, spillages of oil and chemicals, not reporting accidental breakages of tools or equipment and not following laid-down working practices and procedures)

2.8. Describe the sources of information for safety (such as local work procedures, codes of practice or guidance, the severity of the accident or injury that the hazard may cause)

2.9. Describe the control measures that can be used to eliminate/reduce the hazard (such as lock-off and permit to work procedures, provision of safe access and egress, use of guards and fume extraction equipment, use of personal protective equipment)

2.10. Describe the first aid facilities that exist within their work area and within the organisation in general, and the procedures to be followed in the case of accidents involving injury

2.11. Explain what constitute dangerous occurrences and hazardous malfunctions, and why these must be reported even if no-one was injured

2.12. Describe the procedures for sounding the emergency alarms, evacuation procedures and escape routes to be used, and the need to report their presence at the appropriate assembly point

2.13. Describe the organisational policy with regard to fire fighting procedures; the common causes of fire and what they can do to help prevent them

2.14. Describe the personal protective equipment (PPE) and protective clothing that is available for their areas of activity

	2.15. Describe the need to observe personal protection and hygiene procedures at all times (such as skin care (barrier creams, gloves); eye protection (safety glasses, goggles, full face masks); hearing protection (ear plugs, ear defenders); respiratory protection (fume extraction, face masks, breathing apparatus; head protection (caps with hair restraints, protective helmets); foot protection (safety footwear); dangers of ingestion and the importance of washing hands) 2.16. Explain how to act responsibly within the working environment (such as observing restricted area notices, complying with warning signs, walking not running, using equipment only for its intended purpose, not interfering with equipment or process that are not within their job role, following approved safety procedures at all times) 2.17. Describe the methods of manually handling and moving loads (such as pushing, pulling, levering); how to lift and carry loads safely and correctly (such as from ground level, waist high, overhead, reaching over); and the manual and mechanical lifting and moving aids available 2.18. Describe good housekeeping arrangements (such as maintaining cleanliness of their work area; removal of waste materials; storage of materials, tools and equipment and products; maintenance of access and egress (such as clear walkways, emergency exits)) 2.19. Explain when to act on their own initiative and when to seek help and advice from others 2.20. Explain to whom they should report in the event of problems that they cannot resolve

UNIT PEO2-002	**CARRYING OUT ENGINEERING ACTIVITIES EFFICIENTLY AND EFFECTIVELY**
LEVEL	**2**
CREDIT VALUE	**4**
GUIDED LEARNING HOURS	**29**

Unit Overview

This unit covers the skills and knowledge needed to prove the competences required to cover a broad range of basic activities that will prepare the learner for entry into the engineering or manufacturing sectors, creating a progression between education and employment, or that will act as a basis for the development of additional skills and occupational competences in the working environment.

Prior to undertaking the engineering activity, the learner will be required to carry out all necessary preparations, within the scope of their responsibility. This will include preparing the work area and ensuring that it is in a safe condition to carry out the intended activities. The learner will need to obtain the appropriate job documentation, work instructions, tools, equipment and materials required for the work activities undertaken, and to check they are in a safe and usable condition. Planning their work activities before they start them will also form part of this unit.

On completion of the engineering activity, the learner will be required to return their immediate work area to an acceptable condition before undertaking further work. This may involve placing part-completed or completed work in the correct location, returning and/or storing any tools and equipment in the correct area, removing any waste and/or scrapped materials, and reporting any defects or damage to the tools and equipment used.

In order to be efficient and effective in the workplace, the learner will also be required to demonstrate that they can create and maintain effective working relationships with colleagues and supervisors. The learner will be expected to review objectives and targets for their personal development and to contribute to, and communicate any opportunities for, improvements that could be made to working practices and procedures.

The learner's responsibilities will require them to comply with health and safety requirements and organisational policy and procedures for the activities undertaken. The learner will need to take account of any potential difficulties or problems that may arise with the activities, and to seek appropriate help and advice in determining and implementing a suitable solution. The learner will work under a high level of supervision, whilst taking responsibility for their own actions and for the quality and accuracy of the work that they carry out.

The learner's knowledge will provide a good understanding of their work, and will provide an informed approach to working efficiently and effectively in an engineering environment. The learner will understand the need to work efficiently and effectively, and will know about the things they need to consider when preparing and tidying up the work area. The learner will know how to contribute to improvements, deal with problems, maintain effective working relationships, and agree their development objectives and targets, in adequate depth to provide a sound basis for carrying out the activities safely and correctly.

The learner will understand the safety precautions required when carrying out the specific engineering activities. The learner will be required to demonstrate safe working practices throughout, and will understand the responsibility they owe to themselves and others in the workplace.

Assessment Guidance and Evidence Requirements

Evidence Requirements

The Evidence Requirements for this unit are identified in the Assessment Criteria.

Assessment Guidance

- This unit is subject to the requirements of GQA which can be found in the Performing Engineering Operations Qualification Handbook.

Learning Outcome and Assessment Criteria

Learning outcomes **The learner will:**	**Assessment criteria** **The learner can:**
1. Work efficiently and effectively in engineering	1.1. Work safely at all times, complying with health and safety legislation, regulations and other relevant guidelines 1.2. Ensure that they apply all of the following checks and practices at all times during the engineering activities: a) adhere to procedures or systems in place for risk assessment, COSHH, personal protective equipment and other relevant safety regulations b) wear the appropriate personal protective equipment for the work area and specific activity being carried out c) use all tools and equipment safely and correctly, and only for their intended purpose d) ensure that the work area is maintained and left in a safe and tidy condition 1.3. Plan the engineering activities before they start them 1.4. Prepare for the specific engineering activity, by producing a work plan which includes all of the following: a) documentation required (such as drawings, technical/reference documents - such as tapping drill sizes, imperial to metric conversion books, component specifications, quality documentation) b) materials required (such as stock material, components, part-machined components, cables/wire, welding consumables) c) equipment required (such as machine tools to be used, lifting and handling equipment, bending and forming equipment, anti-static equipment, test equipment) d) workholding methods and equipment (such as machine or bench vice, clamps, special workholding arrangements), where appropriate e) tools required (such as hand tools, portable power tools, cutting tools, soldering irons) f) measuring equipment required (such as mechanical, electrical, pressure, flow, level, speed, sound) g) the operating sequence to be followed h) timescale required to complete the engineering operations

1.5. Prepare the work area for carrying out the engineering activity

1.6. Prepare to carry out the engineering activity, ensuring all of the following, as applicable to the work to be undertaken:
   a) the work area is free from hazards and is suitably prepared for the activities to be undertaken
   b) any required safety procedures are implemented
   c) any necessary personal protection equipment is obtained, and is in a usable condition
   d) tools and equipment required are obtained and checked that they are in a safe and usable condition
   e) all necessary drawings, specifications and associated documents are obtained
   f) job instructions are obtained and understood
   g) the correct materials or components are obtained
   h) appropriate authorisation to carry out the work is obtained

1.7. Obtain all necessary tools and equipment and check that they are in a safe and usable condition

1.8. Deal promptly and effectively with problems within their control, and seek help and guidance from the relevant people if they have problems that they cannot resolve

1.9. Deal with problems affecting the engineering activity, to include two of the following:
   a) materials
   b) tools and equipment
   c) drawings
   d) job specification
   e) quality
   f) people
   g) timescales
   h) safety
   i) work activities or procedures

1.10. Maintain effective working relationships with colleagues and supervisors

1.11. Create and maintain effective working relationships, to include carrying out all of the following:
   a) turning up at their place of work on time and suitably dressed for the work activities to be carried out
   b) following instructions given to them and checking out any uncertainties before they start work
   c) seeking information and assistance in a courteous and polite manner
   d) taking advice from others in a positive way
   e) dealing with disagreements in an amicable and constructive way
   f) communicating with others nearby to make sure that they know about actions they are taking which may affect their work
   g) showing respect for the views, rights and property of others

	1.12. Review personal training and development, as appropriate to the job role 1.13. Contribute to developing their own engineering competence, to include all of the following: a) describing the levels of skill, knowledge and understanding needed for competence in the areas of work expected of them b) describing their development objectives/program, and how these were identified c) providing information on their expectations and progress towards their identified objectives d) using feedback and advice to improve their personal performance 1.14. Tidy up the work area on completion of the engineering activity 1.15. Complete the work activities, to include all of the following: a) returning tools and equipment to the designated location b) returning drawings and work instructions c) disposing of waste materials, in line with organisational and environmental requirements d) completing all necessary documentation accurately and legibly e) identifying, where appropriate, any damaged or unusable tools or equipment 1.16. Contribute to, and communicate opportunities for, improvement to working practices and procedures 1.17. Contribute to organisational procedures for identifying opportunities for improvement to one of the following: a) working practices b) working methods c) quality d) tools and equipment e) internal communication f) teamwork g) training and development h) safety i) other
2. Know how to work efficiently and effectively in engineering	2.1. Describe the safe working practices and procedures to be followed whilst preparing and tidying up their work area 2.2. Explain how to present themselves in the workplace suitably dressed for the activities to be undertaken (such as being neat, clean and dressed in clothes appropriate to the area of activity; ensuring that, if they have long hair, it is tied back or netted; and removing any jewellery or other items that can become entangled in the machinery) 2.3. Describe the personal protective equipment to be worn for the engineering activities undertaken (such as correctly fitting overalls, safety shoes, eye protection, ear protection)

2.4. Describe the correct use of any equipment used to protect the health and safety of themselves and their colleagues

2.5. Explain how to plan and prepare to carry out the engineering activity (such as obtaining the appropriate drawings/documentation to be used, determining the materials required, determining the tools and equipment required, determining a suitable sequence of operations, determining the quality checks to be made and equipment to be used)

2.6. Describe the procedure for ensuring that all documentation relating to the work being carried out is available, prior to starting the activity

2.7. Describe the procedure for ensuring that all tools and equipment are available prior to undertaking the activity

2.8. Describe the checks to be carried out to ensure that tools and equipment are in full working order, prior to undertaking the activity

2.9. Describe the checks to be carried out to ensure that all materials required are correct and complete, prior to undertaking the activity

2.10. Describe the action that should be taken if documentation, tools and equipment or materials are incomplete or do not meet the requirements of the activity

2.11. Describe their role in helping to develop their own skills and knowledge (such as checking with their supervisor about the work they are expected to carry out and the standard they need to achieve; the safety points to be aware of and the skills and knowledge they will need to develop)

2.12. Describe the benefits of continuous personal development, and the training opportunities that are available in the workplace

2.13. Describe the importance of reviewing their training and development with trainers and supervisors, of comparing the skills, knowledge and understanding that they have at any given point with the competences they need to develop, and of setting objectives to overcome any shortfall or address any development needs

2.14. Describe their responsibilities for providing evidence of their performance and progress (such as submitting work for assessment or the completion of assignments or tests)

2.15. Describe the importance of maintaining effective working relationships within the workplace (such as listening attentively to instructions told to them by their supervisor, making sure they ask for help and advice in a polite and courteous manner, responding positively to requests for help from others)

	2.16. Describe the reason for informing others of their activities which may have impact on their work (such as the need to temporarily disconnect a shared resource like electricity or compressed air supply; making undue noise or creating sparks, fumes or arc flashes from welding) 2.17. Explain how to deal with disagreements with others in ways which will help to resolve difficulties and maintain long term relationships 2.18. Describe the organisational procedures to deal with and report any problems that can affect working relationships 2.19. Describe the difficulties that can occur in working relationships, and how to resolve them 2.20. Describe the sorts of attitudes and requests that are likely to create conflict or negative responses 2.21. Describe the regulations that affect how they should be treated at work (such as Equal Opportunities and Equal Pay, Race Relations and Sex Discrimination, Working Time Directive, Disabled Persons Acts) 2.22. Describe the importance of making a contribution to improving working practices and procedures, and the procedure and format for making suggestions for improvements 2.23. Describe the benefits to them and to the organisation if improvements can be identified and implemented 2.24. Describe the need to dispose of waste materials and consumables (such as oils and chemicals) in a safe and environmentally friendly way 2.25. Explain where tools and equipment should be stored and located, and the importance of returning all tools and documentation to their designated area on completion of their work activities 2.26. Explain when to act on their own initiative and when to seek help and advice from others 2.27. Describe the importance of leaving the work area in a safe condition on completion of their activities (such as equipment correctly isolated, cleaning the work area and removing and disposing of waste)

UNIT PEO2-003	**USING AND COMMUNICATING TECHNICAL INFORMATION**
LEVEL	**2**
CREDIT VALUE	**4**
GUIDED LEARNING HOURS	**29**

Unit Overview

This unit covers the skills and knowledge needed to prove the competences required to make full use of text, numeric and graphical information, by interpreting and using technical information extracted from a range of documentation such as engineering drawings, technical manuals, technical specifications, reference tables and charts, electronic displays, planning and quality control documentation.

This will prepare the learner for entry into the engineering or manufacturing sectors, creating a progression between education and employment, or will act as a basis for the development of additional skills and occupational competences in the working environment.

The learner will be required to extract the necessary data from the various specifications and related documentation, in order to establish and carry out the work requirements, and to make valid decisions about the quality and accuracy of the work carried out. The learner will also need to be able to communicate and record technical information, using a range of different methods such as producing detailed sketches, preparing work planning documentation, producing technical reports and recording data from testing activities.

The learner's responsibilities will require them to comply with organisational policy and procedures for obtaining, using and communicating the technical information applicable to the activity. The learner will need to take account of any potential difficulties or problems that may arise with the activities, and to seek appropriate help and advice in determining and implementing a suitable solution. The learner will work under a high level of supervision, whilst taking responsibility for their own actions and for the quality and accuracy of the work that they carry out.

The learner's knowledge will provide a good understanding of the types of documentation available for use, and will provide an informed approach to applying and communicating engineering instructions and procedures. The learner will be able to read and interpret the documentation available, and will know about the conventions, symbols and abbreviations to the required depth to provide a sound basis for carrying out the activities to the required specification.

Assessment Guidance and Evidence Requirements

Evidence Requirements

The Evidence Requirements for this unit are identified in the Assessment Criteria.

Assessment Guidance

- This unit is subject to the requirements of GQA which can be found in the Performing Engineering Operations Qualification Handbook.

Learning Outcome and Assessment Criteria

Learning outcomes **The learner will:**	**Assessment criteria** **The learner can:**
1. Use and communicate technical information	1.1. Use the approved source to obtain the required data, documentation or specifications, to include all of the following: a) check the currency and validity of the data and documentation used b) exercise care and control over the documents at all times c) correctly extract all necessary data in order to carry out the required tasks d) seek out additional information where there are gaps or deficiencies in the information obtained e) deal with or report any problems found with the data f) make valid decisions based on the evaluation of the engineering information g) return all documentation to the approved location on completion of the work h) complete all necessary production documentation 1.2. Extract and interpret information from engineering drawings and other related documentation 1.3. Use information extracted from engineering documentation, to include one or more of the following: a) detailed component drawings b) general assembly drawings c) repair drawings d) fluid power drawings e) wiring/circuit diagrams f) installation drawings g) approved sketches h) illustrations i) visual display screens j) modification drawings k) sub-assembly drawings l) schematic diagrams m) fabrication drawings n) pattern drawings o) welding drawings p) casting drawings q) operational diagrams r) physical layouts s) manufacturers' manuals/drawings t) photographic representations u) contractual specifications 1.4. Use information extracted from related documentation, to include two from the following: a) job instructions b) drawing instructions c) test schedules d) manufacturers' instructions e) welding procedure specifications f) material specifications g) finishing specifications

	h) reference tables/charts i) national, international and organisational standards j) planning documentation k) quality control documents l) operation sheets m) process specifications 1.5. Extract information that includes three of the following: a) materials or components required b) dimensions c) tolerances d) build quality e) installation requirements f) connections to be made g) surface texture requirements h) location/orientation of parts i) process or treatments required j) assembly sequence k) inspection requirements l) part numbers for replacement parts m) surface finish required n) weld type and size o) operations required p) shape or profiles q) test points to be used r) circuit characteristics (such as pressure, flow, current, voltage, speed) 1.6. Report any inaccuracies or discrepancies in the drawings and specifications 1.7. Use the information obtained to establish work requirements 1.8. Record and communicate the technical information by appropriate means to include three of the following methods: a) producing fully detailed sketches of work/circuits completed or required b) preparing work planning documentation c) recording data from testing activities d) producing technical reports on activities they have completed e) completing material and tool requisition documentation f) producing a list of replacement parts required for a maintenance activity g) completing training records or portfolio references 1.9. Deal promptly and effectively with problems within their control, and seek help and guidance from the relevant people if they have problems that they cannot resolve
2. Know how to use and communicate technical information	2.1. Describe the information sources used for the data and documentation that they use in their work activities (such as verbal, written, electronic) 2.2. Explain why technical information is presented in different forms (such as drawings, data sheets, and national and international standards)

	2.3. Explain how and where to obtain the various documents that they will be using (such as safety handouts, drawings, planning documentation, work instructions, maintenance records, technical manuals and reference tables/charts), and how to check that they are current and valid 2.4. Describe the types of engineering drawings used, and how they interrelate (such as isometric and orthographic drawings; assembly, sub-assembly and general arrangement drawings; circuit and wiring diagrams, block and schematic diagrams; fluid power and instrumentation and control diagrams) 2.5. Describe the meaning of the different symbols and abbreviations found on the documents that they use (such as surface finish to be achieved, linear and geometric tolerances, electronic components, weld symbols and profiles, pressure and flow characteristics, torque values, imperial and metric systems of measurement, tolerancing and fixed reference points) 2.6. Explain how to use other sources of information to support the data (such as electronic component pin configuration specifications, standard reference charts for limits and fits, tapping drill reference charts, bend allowances required for material thickness, electrical conditions required for specific welding rods, mixing ratios for bonding and finishing materials, metal finishing specifications and inspection requirements) 2.7. Describe the procedures for reporting discrepancies in the data or documents, and for reporting lost or damaged drawings and documents 2.8. Describe the care and control procedures for the documents, how damage or graffiti on drawings can lead to scrapped work and the importance of returning them to the designated location on completion of the work activities 2.9. Describe the typical ways of communicating technical information (such as sketches, test and inspection reports, work planning documents), and the amount of detail that should be included 2.10. Describe the need to ensure that sketches are of a suitable size, use appropriate drawing conventions, are in proportion and are legible to others 2.11. Explain why it is important to use a fixed common reference point for dimensioning of drawings and sketches 2.12. Explain when to act on their own initiative to find, clarify and evaluate information, and when to seek help and advice from others 2.13. Explain why they should always seek clarification if they are in any doubt as to the validity or suitability of the information they have gathered 2.14. Explain to whom they should report in the event of problems that they cannot resolve