



ETCAL Level 1 Certificate in Performing Engineering Operations
601/1793/X
Assessment

Certificate - Assessment Principles

Introduction

ETA qualifications are developed in conjunction with the industries and employers they service. They are designed to add value and deliver multidimensional outputs that provide impact for both learners and employers.

It is therefore important that the assessment requirements of ETA qualifications are robust whilst not containing unnecessary and over-burdensome challenges that detract from the intended outcomes and impact. These assessment principles are prepared with that in mind and are applicable to this qualification:

Level 1 Certificate in Performing Engineering Operations

Principles

There are four key principles to underpin assessment delivery:

1. Assessment should contribute to developing a learner's knowledge and/or skills and provide relevant and current development as the related industry requires.
2. Systems for capturing evidence of competence should be integrated and efficient. Assessment practices for both competence-based and knowledge-based aspects of qualifications should, where possible, be integrated with industry driven standards and requirements.
3. Assessment methods must be appropriate for the level and nature of the qualification units to be assessed. Methods of assessing achievement against learning outcomes and assessment principles must be accommodating and flexible, whilst remaining appropriate for both the level being assessed and industry expectations of learners at that level.
4. Evidence of knowledge and understanding must be recorded and be clearly attributable to the learner. This can be delivered using task based activity with questions and answer sessions, supported by assessor observation.

The choice and application of assessment methods must be consistent with these principles and will generally include:

- Direct Observation
- Written evidence (portfolio/workbook)
- Centre set assignment
- Centre set coursework
- Oral examination
- Professional/open discussion

Delivery Team Requirements

Tutors / Assessors

- Tutors / Assessors should have a detailed knowledge of, and be competent in, the occupational requirements of the units
- Tutors / Assessors should hold or be working towards the related professional qualifications for delivery and assessment as required
- This competence will have been acquired either in direct employment in the occupational role to which the unit relates, or in employment as a manager, supervisor or in-house trainer of employees carrying out the role
- It is unlikely that occupational competence will have been achieved in less than twelve months of employment but individuals with less experience could be considered as assessors if sufficiently occupationally competent

Internal Quality Assurers (IQAs)

- IQAs must have a thorough understanding of the structure, content and occupational requirements of the units that they are internally quality assuring. This understanding will have been acquired while either working directly within or delivering within the relevant occupational area in either an operational or a support function
- The level of understanding must be sufficient to allow the IQA to judge whether the assessor has fully assessed learners against all the principles within the unit
- It is unlikely that a person could have gained this level of understanding in less than twelve months of being employed but individuals with less experience could be considered as IQAs if they have the required level of experience, knowledge and understanding.

Technical / Expert Witness

Expert witnesses can be drawn from a wide range of people who can observe, 'measure and examine performance against the industry and qualification principles. These can include line managers and experienced individuals within a related sector-based organisation. The Technical Expert Witnesses should have proven practical experience and knowledge relating to the content of the principles being assessed.

It is unlikely that someone could become an expert in their entire job role in less than twelve months of being employed in their industry. They could, however, very quickly become an expert in the content of a single unit if this was the focus of their job role. The assessor should make a

judgement as to the level of expertise held by a potential Technical Expert Witness and, where necessary, this should be confirmed with the awarding organisation.

Assessment Materials

ETC Awards Ltd. (ETA) Assessment Materials are protected by copyright and are supplied only to Approved Centres for use solely for the purpose of the assessment of ETA learners.

Instructions for Conducting Assessment

the Approved Centre must either:

- secure approval of in-house assessment material by ETA's External Quality Assurance team prior to use
- use ETA Assessment Materials
- we recognise that reasonable adjustments may be considered at the time of assessment, please refer to the ETA Reasonable adjustments and considerations policy

All approved centres must then handle and store securely all Assessment Materials in accordance with the following:

- Assessment Material must be accessible to learners only during their programme
- The Approved Centre must not make public in any format the contents of any materials either in part or in full.
- Materials must be securely handled and under no circumstances shared with third party organisations or individuals
- The Approved Centre must seek permission from ETA through the External Quality Assurance team if they want to convert Material for alternative storage, retrieval and delivery in electronic formats.

All centre-based assessment material must be agreed with ETA prior to use and will be subject to robust monitored during sampling and verification activity.

A large, stylized outline of the word 'eta' in a rounded, lowercase font. The 'e' is gold, the 't' is black, and the 'a' is grey, matching the logo in the top right corner.

Level 1 Unit – Working safely in an engineering environment

Unit aim

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.

Unit introduction

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

To achieve this unit, the learner needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria determine the standard required to achieve the unit through a variety of assessment methods appropriate to the delivery environment.

Unit Reference Number		L/600/5781
Qualification Framework		RQF
Title		Working safely in an engineering environment
Unit Level		Level 1
Guided Learning Hours		33
Unit Credit Value		5
Unit Grading Structure		Pass / Fail

Learning Outcome		Assessment Criteria - The learner can		Criteria expansion
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: <ul style="list-style-type: none"> • applying in principle their duties and responsibilities as an individual under the Health and Safety at Work Act and other relevant current legislation • identifying, within their working environment, appropriate sources of information and guidance on health and safety issues, to include: <ul style="list-style-type: none"> • eye protection and personal protective equipment • COSHH regulations • risk assessments • identifying the warning signs and labels of the main groups of hazardous or dangerous substances • 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: <ul style="list-style-type: none"> • present themselves in the workplace suitably dressed/prepared for the activities to be undertaken • observe personal protection and hygiene procedures at all times • act in a responsible manner at all times within the working environment • maintain a tidy workplace, with exits and gangways free from obstructions • use tools and equipment safely and only for the purpose intended 	

			<ul style="list-style-type: none"> • carry out their work activities in accordance with legal requirements and the organisations safety policies • 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: <ul style="list-style-type: none"> • identifying the appropriate qualified first aiders or appointed person, and the location of first aid facilities • identifying the procedures to be followed in the event of injury to themselves or others • following organisational procedures in the event of fire/fire drills and for the evacuation of premises/work area • 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: <ul style="list-style-type: none"> • their working environment (such as working at height, in confined spaces, hot work) • the tools and equipment that they use (such as machines, power tools, cutting tools) • materials and substances that they use (such as cutting fluids/oils, hydraulic fluids, fluxes) • 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: <ul style="list-style-type: none"> • lifting alone • Plus one more of the following: • with assistance of others • 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	



Level 1 Unit – Carrying out engineering activities efficiently and effectively

Unit aim

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.

Unit introduction

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 items 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

To achieve this unit, the learner needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria determine the standard required to achieve the unit through a variety of assessment methods appropriate to the delivery environment.

Unit Reference Number		A/504/6350
Qualification Framework		RQF
Title		Carrying out engineering activities efficiently and effectively
Unit Level		Level 1
Guided Learning Hours		22
Unit Credit Value		3
Unit Grading Structure		Pass / Fail

Learning Outcome		Assessment Criteria - The learner can		Criteria expansion
1.	Carrying out engineering activities efficiently and effectively	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: <ul style="list-style-type: none"> • adhere to procedures or systems in place for risk assessment, COSHH, personal protective equipment (PPE) and other relevant safety regulations • wear the appropriate personal protective equipment for the work area and specific activity being carried out • use all tools and equipment safely and correctly, and only for their intended purpose • ensure that the work area is maintained and left in a safe and tidy condition 	
		1.3	Prepare the work area to carry out the engineering activity	
		1.4	Prepare to carry out the engineering activity, by carrying out all of the following: <ul style="list-style-type: none"> • checking that the work area is free from hazards, and is suitably prepared for the activities to be undertaken • ensuring that any required safety procedures are implemented • obtaining any necessary personal protection equipment, and checking that it is in a usable condition • obtaining all tools and equipment required, and checking that they are in a safe and usable condition • obtaining all necessary drawings, specifications and associated documentation • obtaining the correct materials or components • ensuring that job instructions are understood • obtaining the appropriate authorisation to carry out the work 	

	1.5	Obtain all necessary tools and equipment, and check that they are in a safe and usable condition	
	1.6	Report any difficulties or problems that may arise, and carry out any agreed actions	
	1.7	Complete the work activities, to include all of the following: <ul style="list-style-type: none"> • returning tools and equipment to the designated location • returning drawings and work instructions • disposing of waste materials in line with organisational and environmental requirements • completing all necessary documentation accurately and legibly • identifying and reporting, where appropriate, any damaged or unusable tools or equipment 	
	1.8	Deal with problems affecting the engineering activity, to include two of the following: <ul style="list-style-type: none"> • materials • tools and equipment • drawings • job specification • quality • people • timescales • safety • work activities or procedures 	
	1.9	Maintain effective working relationships with colleagues and supervisors	
	1.10	Create and maintain these working relationships, to include carrying out all of the following: <ul style="list-style-type: none"> • turning up at their place of work on time and suitably dressed for the work activities to be carried out • following instructions given to them, and checking out any uncertainties before they start work • seeking information and assistance in a courteous and polite manner • taking advice from others in a positive way • dealing with disagreements in an amicable and constructive way • ensuring that others nearby know about any actions they are taking which may affect their work • showing respect for the views, rights and property of others 	
	1.11	Assist in the review of their personal training and development, as appropriate to the job role	
	1.12	Contribute to developing their own engineering competence, to include all of the following: <ul style="list-style-type: none"> • describing the levels of skill, knowledge and understanding needed for competence in the areas of work expected of you 	

			<ul style="list-style-type: none"> describing your development objectives/program, and how these were identified using feedback and advice to improve their personal performance 	
		1.13	Tidy up the work area on completion of the engineering activity	
2.	Know how to carry out engineering activities efficiently and effectively	2.1	State the safe working practices and procedures to be followed whilst preparing and tidying up their work area	
		2.2	Describe how to present themselves in the workplace, suitably dressed for the activities to be undertaken (such as being neat, clean and dressed in clothes which are appropriate to the area of activity; ensuring that, if you 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	State the personal protective equipment (PPE) to be worn for the engineering activities undertaken (such as correctly fitting overalls, safety shoes, eye protection, ear protection)	
		2.4	State the correct use of any equipment used to protect the health and safety of themselves and their colleagues	
		2.5	State the procedure for ensuring that all tools, equipment, materials and documentation relating to the work being carried out is available, prior to starting the activity	
		2.6	State the checks to be carried out to ensure that tools and equipment are safe to use, and in full working order, prior to undertaking the activity	
		2.7	State the action that should be taken if tools, equipment, materials or documentation are incomplete or do not meet the requirements of the activity	
		2.8	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)	
		2.9	State the benefits of continuous personal development and the training opportunities that are available in the workplace	
		2.10	State the importance of reviewing their training and development with trainers and supervisors, to think about and compare the skills, knowledge and understanding that they have at any given point with the competence they need to develop, and to set objectives to overcome any shortfall or development needs	
		2.11	State the importance of maintaining effective working relationships within the workplace (such as listening attentively to instructions told to them by their supervisor, making sure that they ask for help and advice in a polite and courteous manner, responding positively to requests for help from others)	
		2.12	State the reasons 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)	
		2.13	Describe how to deal with disagreements with others in ways which will help to resolve difficulties and maintain long term relationships	

	2.14	State the organisational procedures to deal with and report any problems that can affect working relationships	
	2.15	State the difficulties that can occur in working relationships, and how to resolve them	
	2.16	State the sorts of attitudes and requests that are likely to create conflict or negative responses	
	2.17	State 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)	
	2.18	State the need to dispose of waste materials, and consumables (such as oils and chemicals) in a safe and environmentally friendly way	
	2.19	Describe 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 work activities	
	2.20	Describe when they should act on their own initiative and when to seek help and advice from others	
	2.21	State the importance of leaving the work area and equipment in a safe condition on completion of activities (such as equipment correctly isolated, cleaning the work area, and removing and disposing of waste)	



Level 1 Unit – Using and communicating technical information

Unit aim

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.

Unit introduction

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

To achieve this unit, the learner needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria determine the standard required to achieve the unit through a variety of assessment methods appropriate to the delivery environment.

Unit Reference Number		J/504/6352
Qualification Framework		RQF
Title		Using and communicating technical information
Unit Level		Level 1
Guided Learning Hours		22
Unit Credit Value		3
Unit Grading Structure		Pass / Fail

Learning Outcome		Assessment Criteria - The learner can		Criteria expansion
1.	Using and communicating technical information	1.1	Use the approved sources to obtain the required data, documentation or specifications	
		1.2	In using these sources to obtain the necessary data and related specifications, carry out all of the following: <ul style="list-style-type: none"> • exercise care and control over the documents at all times • correctly extract all necessary data in order to carry out the required tasks • seek out additional information where there are gaps or deficiencies in the information obtained • deal with or report any problems found with the data • return all documentation to the approved location on completion of the work • complete all necessary production documentation 	
		1.3	Extract and interpret information from engineering drawings and other related documentation	
		1.4	Use information extracted from engineering documentation, to include one or more of the following: <ul style="list-style-type: none"> • detailed component drawings • general assembly drawings • repair drawings • fluid power drawings • wiring/circuit diagrams • installation drawings • approved sketches • illustrations • visual display screens • modification drawings • sub-assembly drawings 	

		<ul style="list-style-type: none"> • schematic diagrams • fabrication drawings • pattern drawings • welding drawings • casting drawings • operational diagrams • physical layouts • manufacturers' manuals/drawings • photographic representations • contractual specifications 	
	1.5	<p>Use information extracted from related documentation, to include one from the following:</p> <ul style="list-style-type: none"> • job instructions • drawing instructions • test schedules • manufacturers' instructions • welding procedure specifications • material specifications • finishing specifications • reference tables/charts • national, international and organisational standards • planning documentation • quality control documents • operation sheets • process specifications 	
	1.6	<p>Extract information that includes three of the following:</p> <ul style="list-style-type: none"> • materials or components required • dimensions • tolerances • build quality • installation requirements • connections to be made • circuit characteristics (such as pressure, flow, current, voltage speed) • surface texture requirements • location/orientation of parts • process or treatments required • assembly sequence • inspection requirements 	

			<ul style="list-style-type: none"> • part numbers for replacement parts • surface finish required • weld type and size • operations required • shape or profiles • test points to be used 	
		1.7	Report any inaccuracies or discrepancies in the drawings and specifications	
		1.8	Use the information obtained to establish work requirements	
		1.9	Record and communicate the technical information, using appropriate means	
		1.10	Include two of the following when recording and communicating the technical information: <ul style="list-style-type: none"> • producing fully detailed sketches of work/circuits completed or required • recording data from testing activities • producing reports on activities that you have completed • completing material and tool requisition documentation • producing a list of replacement parts required for a maintenance activity • completing training records or portfolio references • completing quality documentation 	
		1.11	Report any difficulties or problems that may arise with using or communicating the information, and carry out any agreed actions	
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	State why technical information is presented in different forms (such as drawings, job instructions, data sheets and national and international standards)	
		2.3	State 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	State 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 electrodes, mixing ratios for bonding and finishing materials, metal finishing specifications and inspection requirements)	
	2.7	Describe the procedures for reporting any discrepancies in the data or documents, and for reporting lost or damaged drawings and documents	
	2.8	State 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	State 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	State when to act on their own initiative to find, clarify and evaluate information, and when to seek help and advice from others	
	2.12	State why they should always seek clarification if they are in any doubt as to the validity or suitability of the information that they have gathered	
	2.13	State to whom they should report in the event of problems that they cannot resolve	



Level 1 Unit – Making components using hand tools and fitting techniques

Unit aim

This unit covers the skills and knowledge needed to prove the competences required for carrying out basic hand fitting that will prepare the learner for entry into the engineering or manufacturing sectors, creating a progression between education and employment, or that will provide a basis for the development of additional skills and occupational competences in the working environment.

The learner will be expected to prepare for the hand fitting activities by obtaining all the necessary job instructions, materials, tools, equipment and any documentation that may be required.

In producing the components, the learner will be expected to use appropriate tools and equipment to mark out the material for a range of features to be produced, and then to use hand tools, portable power tools, shaping and fitting techniques appropriate to the type of material and operations being performed. These activities will include hand sawing, band sawing, filing, drilling, chiselling, threading, scraping, lapping and off-hand grinding. The components produced will have features that include flat, square, parallel and angular faces, radii and curved profiles, drilled holes, internal and external threads, and sliding or mating parts.

During, and on completion of, the fitting operations, the learner will be expected to check the quality of the workpiece, using measuring equipment appropriate to the aspects being checked and the tolerances to be achieved. The learner will need to be able to recognise fitting defects, to take appropriate action to put right any faults that occur, and to ensure that the finished workpiece is within the drawing requirements. On completion of the fitting activities, the learner will be expected to return all tools and equipment to the correct location, and to leave the work area in a safe and tidy condition.

Unit introduction

The learner's responsibilities will require them to comply with health and safety requirements and organisational policy and procedures for the fitting activities undertaken. The learner will need to report any difficulties or problems that may arise and carry out any agreed actions.

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 an understanding of their work and will enable them to apply appropriate hand fitting techniques safely. The learner will understand the hand fitting process, and its application, and will know about the equipment, materials and consumables, to the required depth to provide a sound basis for carrying out the activities to the required specification.

The learner will understand the safety precautions required when using hand fitting techniques, and when using hand and power tools. 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

To achieve this unit, the learner needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria determine the standard required to achieve the unit through a variety of assessment methods appropriate to the delivery environment.

Unit Reference Number		Y/504/6355
Qualification Framework		RQF
Title		Making components using hand tools and fitting techniques
Unit Level		Level 1
Guided Learning Hours		63
Unit Credit Value		10
Unit Grading Structure		Pass / Fail

Learning Outcome		Assessment Criteria - The learner can		Criteria expansion
1.	Making components using hand tools and fitting techniques	1.1	Work safely at all times, complying with health and safety legislation, regulations and other relevant guidelines	
		1.2	Carry out all of the following during the hand fitting activities: <ul style="list-style-type: none"> • adhere to procedures or systems in place for risk assessment, COSHH, personal protective equipment (PPE) and other relevant safety regulations • follow job instructions, assemblies drawings and procedures • ensure that all power tool cables, extension leads or air supply hoses are in a serviceable condition • check that all measuring equipment is within calibration date • apply safe and appropriate hand fitting techniques and procedures at all times • return all tools and equipment to the correct location on completion of the fitting activities 	
		1.3	Obtain the appropriate tools and equipment for the hand fitting operations, and check that they are in a safe and usable condition	
		1.4	Use all of the following measuring equipment during the hand fitting and checking activities: <ul style="list-style-type: none"> • rules • squares • external micrometers • surface finish equipment (such as comparison plates, machines) 	
		1.5	Mark out the components for the required operations, using appropriate tools and techniques	
		1.6	Mark out material forms, to include one of the following: <ul style="list-style-type: none"> • square/rectangular (such as bar stock, sheet material, machined components) • circular/cylindrical (such as bar stock, tubes, turned components, flat discs) 	

		<ul style="list-style-type: none"> • sections (such as angles, channel, tee section, joists, extrusions) • irregular shapes (such as castings, forgings, odd shaped components) 	
	1.7	<p>Use marking out methods and techniques, including one of the following:</p> <ul style="list-style-type: none"> • direct marking using instruments • use of templates • tracing/transfer methods 	
	1.8	<p>Use a range of marking out equipment, to include five of the following:</p> <ul style="list-style-type: none"> • rules/tapes • dividers/trammels • scribes • punches • scribing blocks • squares • protractor • Vernier instruments 	
	1.9	<p>Mark out workpieces, to include five of the following features:</p> <ul style="list-style-type: none"> • datum/centre lines • square/rectangular profiles • angles/angular profiles • circles • radial profiles • linear hole positions • radial hole positions 	
	1.10	<p>Cut and shape the materials to the required specification, using appropriate tools and techniques</p>	
	1.11	<p>Use a range of hand fitting activities, to include five of the following:</p> <ul style="list-style-type: none"> • filing • hand sawing • drilling • producing internal threads • power sawing • off hand grinding • scraping • chiselling • lapping • producing external threads 	

		<p>1.12 Produce components which combine different fitting operations and cover six of the following:</p> <ul style="list-style-type: none"> • flat datum faces • faces which are square to each other • faces which are parallel to each other • faces angled to each other • curved profiles • drilled holes (through or to a depth) • reamed holes • internal threads • external threads • counterbore, countersink, or spot face • sliding or mating parts 	
		<p>1.13 Cut and shape one type of material from the following:</p> <ul style="list-style-type: none"> • low carbon/mild steel • high carbon steel • cast iron • stainless steel • aluminium/aluminium alloys • brass/brass alloys • plastic/nylon/synthetic • composite • other specific material 	
		<p>1.14 Check that the finished components meet the standard required</p>	
		<p>1.15 Carry out checks for accuracy, to include five of the following:</p> <ul style="list-style-type: none"> • linear dimensions • flatness • squareness • angles • profiles • hole position • hole size/fit • thread size and fit • surface finish 	
		<p>1.16 Produce components to all of the following standards, as applicable to the process:</p> <ul style="list-style-type: none"> • components to be free from false tool cuts, burrs and sharp edges • dimensional tolerance +/- 0.25mm or +/- 0.010" • flatness and squareness 0.1mm per 25mm or 0.004" per inch 	

			<ul style="list-style-type: none"> • angles within +/- 1 degree • surface finish 63µin or 1.6 µm 	
		1.17	Report any difficulties or problems that may arise with the fitting activities, and carry out any agreed actions	
		1.18	Leave the work area in a safe and tidy condition on completion of the fitting activities	
2.	Know how to make components using hand tools and fitting techniques	2.1	State the health and safety requirements, and safe working practices and procedures required for the hand fitting activities undertaken	
		2.2	State the importance of wearing appropriate protective clothing and equipment (PPE), and keeping the work area safe and tidy	
		2.3	State the hazards associated with the hand fitting activities (such as use of power tools, trailing leads or hoses, damaged or badly maintained tools and equipment, using files with damaged or poor fitting handles), and how they can be minimised	
		2.4	State the procedure for obtaining the required drawings, job instructions and other related specifications	
		2.5	Describe how to use and extract information from engineering drawings and related specifications (to include BS or ISO standard symbols and abbreviations, imperial and metric systems of measurement, workpiece reference points and system of tolerancing)	
		2.6	Describe how to prepare the materials in readiness for the marking out activities, in order to enhance clarity, accuracy and safety (such as visually checking for defects, cleaning the materials, removing burrs and sharp edges, applying a marking out medium)	
		2.7	Describe how to select and establish a suitable datum; the importance of ensuring that marking out is undertaken from the selected datum, and the possible effects of working from a different datum	
		2.8	Describe methods of holding and supporting the workpiece during the marking out activities, and the equipment that can be used for this (such as surface plates, angle plates, vee blocks and clamps, parallel bars)	
		2.9	Describe use of marking out conventions when marking out the workpiece (including datum lines, cutting guidelines, square and rectangular profiles, circular and radial profiles, angles, holes which are linearly positioned, boxed and on pitch circles)	
		2.10	State the cutting and shaping methods to be used, and the sequence in which the operations will be carried out	
		2.11	State the various types of file that are available, the cut of files for different applications, and the importance of ensuring that file handles are secure and free from embedded foreign bodies or splits	
		2.12	Describe the use of vice jaw plates to protect the workpiece from damage	
		2.13	Describe how to file flat, square and curved surfaces and achieve a smooth surface finish (such as by draw filing, the use of abrasive cloth, lapping using abrasive pastes)	

	2.14	State how to select saw blades for different materials, and how to set the saw blades for different operations (such as cutting externally and internally)	
	2.15	State how to cut external threads (using hand dies), and the method of fixing and adjusting the dies to give the correct thread fit	
	2.16	State how to determine the drill size for tapped holes, and the importance of using the taps in the correct sequence	
	2.17	State how to prepare drilling machines for operations (such as adjustment of table height and position; mounting and securing drills, reamers, countersink and counterbore tools in chucks or Morse taper sockets; setting and adjusting spindle speeds; setting and adjusting guards/safety devices)	
	2.18	State how to mount the workpiece (such as in a machine vice, clamped to table, clamped to angle brackets; techniques of positioning drills to marking out, use of centre drills, and taking trial cuts and checking accuracy, how to correct holes which are off centre)	
	2.19	Describe the problems that can occur with the hand fitting activities, and how these can be overcome (such as defects caused by incorrectly ground drills, inappropriate speeds, damage by workholding devices)	
	2.20	State when to act on their own initiative and when to seek help and advice from others	
	2.21	Describe the importance of leaving the work area in a safe and clean condition on completion of the activities (such as removing and storing power leads, isolating machines, removing and returning drills, cleaning the equipment, and removing and disposing of waste)	

A large, stylized outline of the word 'eta' in a rounded, lowercase font. The 'e' is gold, the 't' is black, and the 'a' is grey, matching the logo in the top right corner.

Level 1 Unit – Assembling mechanical components

Unit aim

This unit covers the skills and knowledge needed to prove the competences required for carrying out basic mechanical assembly that will prepare the learner for entry into the engineering or manufacturing sector, creating a progression between education and employment, or that will provide a basis for the development of additional skills and occupational competences in the working environment.

The learner will be expected to prepare for the assembly activities by obtaining all the necessary job instructions, components, tools, equipment and any documentation that may be required.

In carrying out the assembly operations, the learner will be required to work to instructions in order to produce the required assembly. The assembly activities will include making all necessary checks and adjustments, to ensure the components are correctly orientated, positioned and aligned, that moving parts have the correct working clearances, all fasteners are tightened to the correct torque, and that the assembled parts are checked for completeness and function as per the specification. On completion of the assembly activities, the learner will be expected to return all tools and equipment to the correct location, and to leave the work area in a safe and tidy condition.

Unit introduction

The learner's responsibilities will require them to comply with health and safety requirements and organisational policy and procedures for the assembly activities undertaken. The learner will need to report any difficulties or problems that may arise with the assembly activities, and to carry out any agreed actions. 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 an understanding of their work and will enable them to apply appropriate assembly techniques safely. The learner will understand the assembly process, and its application, and will know about the mechanical equipment being assembled, the components, tools and consumables used, to the required depth to provide a sound basis for carrying out the activities to the required specification.

The learner will understand the safety precautions required when carrying out the assembly activities, and when using assembly tools and equipment. 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

To achieve this unit, the learner needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria determine the standard required to achieve the unit through a variety of assessment methods appropriate to the delivery environment.

Unit Reference Number		D/504/6356
Qualification Framework		RQF
Title		Producing mechanical assemblies
Unit Level		Level 1
Guided Learning Hours		63
Unit Credit Value		10
Unit Grading Structure		Pass / Fail

Learning Outcome		Assessment Criteria - The learner can		Criteria expansion
1.	Assembling mechanical components	1.1	Work safely at all times, complying with health and safety legislation, regulations and other relevant guidelines	
		1.2	Carry out all of the following during the assembly activities: <ul style="list-style-type: none"> • adhere to procedures or systems in place for risk assessment, COSHH, personal protective equipment (PPE) and other relevant safety regulations • follow job instructions, assembly drawings and procedures • ensure that all power tool cables, extension leads or air supply hoses are in a safe and serviceable condition • use lifting and slinging equipment, in accordance with health and safety guidelines and procedures (where appropriate) • ensure that components used are free from foreign objects, dirt or other contamination • apply safe and appropriate assembly techniques and procedures at all times • return all tools and equipment to the correct location on completion of the assembly activities 	
		1.3	Obtain and prepare the appropriate components, tools and equipment	
		1.4	Use the appropriate methods and techniques to assemble the components in their correct positions	
		1.5	Produce assemblies, using four of the following methods and techniques: <ul style="list-style-type: none"> • assembling of components by expansion/contraction • fitting (such as filing, scraping, lapping or polishing) • securing by using mechanical fasteners/threaded devices • applying sealants/adhesives • electrical bonding of components • assembling of products by pressure • setting and adjusting 	

		<ul style="list-style-type: none"> • drilling • reaming • balancing components • applying bolt locking methods • shimming and packing • blue-bedding of components • aligning components • riveting • pinning • torque setting 	
	1.6	<p>Assemble products to meet the required specification, using six of the following types of component:</p> <ul style="list-style-type: none"> • assembly structure (framework, support, casings, panels) • pre-machined components • fabricated components • bearings • seals • bushes • shafts • chains • couplings • sprockets • cams and followers • levers/linkages • keys • pulleys • gears • pipework/hoses • springs • belts • gaskets • other specific components 	
	1.7	<p>Assemble products, using two of the following assembly aids and equipment:</p> <ul style="list-style-type: none"> • workholding devices • lifting and moving equipment • specialised assembly tools/equipment • jigs and fixtures 	

		<ul style="list-style-type: none"> • shims and packing • rollers or wedges • supporting equipment 	
1.8		Secure the components, using the specified connectors and securing devices	
1.9		<p>Use two of the following categories of fastening devices for securing the components:</p> <ul style="list-style-type: none"> • threaded fasteners (such as nuts, bolts, machine screws, cap screws) • locking and retaining devices (such as tab washers, locking nuts, wire locks, special purpose types) • pins (such as parallel/dowels, hollow/roll, tapered, split) • spring clips (such as external circlips, internal circlips, special clips) • rivets (such as countersunk, roundhead, blind, special purpose types) 	
1.10		Check the completed assembly to ensure that all operations have been completed, and that the finished assembly meets the required specification	
1.11		<p>Carry out the required quality checks, to include four of the following, using appropriate equipment:</p> <ul style="list-style-type: none"> • positional accuracy • freedom of movement • component security • completeness • dimensions • orientation • alignment • function • bearing/shaft end float • operating/working clearances • freedom from damage or foreign objects 	
1.12		<p>Produce mechanical assemblies which comply with all of the following:</p> <ul style="list-style-type: none"> • all components are correctly assembled and aligned, in accordance with the specification • moving parts are correctly adjusted and have appropriate clearances • where appropriate, assemblies meet geometric tolerances (such as square, straight, angles free from twists) • all fastenings have appropriate washers and are tightened to the required torque • where appropriate, bolt locking methods are applied 	
1.13		Report any difficulties or problems that may arise with the assembly activities, and carry out any agreed actions	
1.14		Leave the work area in a safe and tidy condition on completion of the assembly activities	

2.	Know how to assemble mechanical components	2.1	State the health and safety requirements, and safe working practices and procedures required for the assembly activities undertaken	
		2.2	State the importance of wearing appropriate protective clothing and equipment (PPE), and keeping the work area safe and tidy	
		2.3	State the hazards associated with the assembly activities (such as use of power tools, trailing leads or air hoses, damaged or badly maintained tools and equipment, lifting and handling heavy items), and how they can be minimised	
		2.4	State the procedure for obtaining the required drawings, job instructions and other related specifications	
		2.5	Describe how to use and extract information from engineering drawings and related specifications (to include BS or ISO standard symbols and abbreviations, imperial and metric systems of measurement, workpiece reference points and system of tolerancing)	
		2.6	Describe how to prepare the components in readiness for the assembly activities (such as visually checking for defects, cleaning the components, removing burrs and sharp edges)	
		2.7	Describe the assembly/joining methods, techniques and procedures to be used, and the importance of adhering to these procedures	
		2.8	Describe how the components are to be aligned, adjusted and positioned prior to securing, and the tools and equipment to be used	
		2.9	State the various mechanical fastening devices that are used (such as nuts, bolts, machine screws, cap screws, clips, pins, locking and retaining devices)	
		2.10	State the importance of using the specified components and joining devices for the assembly, and why the learner must not use substitutes	
		2.11	Describe where appropriate, the application of sealants and adhesives within the assembly activities, and the precautions that must be taken when working with them	
		2.12	Describe how to conduct any necessary checks to ensure the accuracy, position, security, function and completeness of the assembly (such as checking for correct operation where the assembly has moving parts, checking the torque figures to which critical fastenings have been tightened, checking the end float on shafts, checking operating clearance on actuating mechanisms)	
		2.13	Describe how to detect assembly defects (such as ineffective joining techniques, foreign objects, component damage), and what to do to rectify them	
		2.14	State the methods and equipment used to transport, lift and handle components and assemblies	
		2.15	State the importance of ensuring that all tools are in a safe and usable condition, and are used correctly, within their permitted operating range	
		2.16	Describe problems with the assembly operations, and the importance of informing appropriate people of non-conformances	
		2.17	Describe when to act on their own initiative and when to seek help and advice from others	

		2.18	State the importance of leaving the work area in a safe and clean condition on completion of the assembly activities (such as removing and storing power leads, returning hand tools and equipment to the designated location, cleaning the work area, and removing and disposing of waste)	
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Level 1 Unit – Carrying out pipe fitting activities

Unit aim

This unit covers the skills and knowledge needed to prove the competences required for carrying out basic pipe fitting that will prepare the learner for entry into the engineering or manufacturing sectors, creating a progression between education and employment, or that will provide a basis for the development of additional skills and occupational competences in the working environment.

The learner will be expected to prepare for the pipe fitting activities, by obtaining all the necessary job instructions, materials, tools, equipment and any documentation that may be required.

In carrying out the pipe fitting activities, the learner will be expected to use a range of hand tools, pipe bending and forming equipment and pipe assembly techniques, appropriate to the type of pipe and operations being performed. Pipe fitting activities will include, cutting the pipes to the required lengths, bending and forming pipes and assembling them using a range of different pipe connectors.

During, and on completion of, the pipe fitting operations, the learner will be expected to check the quality of their work, to recognise pipe bending and fitting defects, to take appropriate action to put right any faults that occur, and to ensure that the finished workpiece is within the drawing/job requirements. On completion of the pipe fitting activities, the learner will be expected to return all tools and equipment to the correct location, and to leave the work area in a safe and tidy condition.

Unit introduction

The learner's responsibilities will require them to comply with health and safety requirements and organisational policy and procedures for the pipe fitting activities undertaken. The learner will need to report any difficulties or problems that may arise with the pipe fitting activities, and to carry out any agreed actions. 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 an understanding of their work and will enable them to apply appropriate pipe fitting techniques safely.

The learner will understand the pipe fitting equipment and techniques used, and their application, and will know about the equipment, materials and consumables, to the required depth to provide a sound basis for carrying out the activities to the required specification.

The learner will understand the safety precautions required when carrying out the pipe fitting activities, and when using the associated tools and equipment. 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

To achieve this unit, the learner needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria determine the standard required to achieve the unit through a variety of assessment methods appropriate to the delivery environment.

Unit Reference Number		H/504/6357
Qualification Framework		RQF
Title		Carrying out pipe fitting activities
Unit Level		Level 1
Guided Learning Hours		63
Unit Credit Value		10
Unit Grading Structure		Pass / Fail

Learning Outcome		Assessment Criteria - The learner can		Criteria expansion
1.	Carrying out pipe fitting activities	1.1	Work safely at all times, complying with health and safety legislation, regulations and other relevant guidelines	
		1.2	Carry out all of the following during the pipe fitting activities: <ul style="list-style-type: none"> • adhere to procedures or systems in place for risk assessment, COSHH, personal protective equipment (PPE) and other relevant safety regulations • follow job instructions, assembly drawings and procedures • check that the bending and forming equipment is in a safe and usable condition • apply safe and appropriate pipe fitting techniques and procedures at all times • return all tools and equipment to the correct location on completion of the pipe fitting activities • apply safe working practise at all times 	
		1.3	Cut the pipes to the appropriate lengths, ensuring appropriate allowances for bending and attachment of fittings	
		1.4	Cut and prepare the pipes for forming and assembly, to include carrying out all of the following: <ul style="list-style-type: none"> • cutting pipes to the correct length, with appropriate allowance for fittings • removing all external and internal burrs • cleaning pipe ends for soldering or cementing (where appropriate) • cutting threads on pipe ends, to the appropriate length (where appropriate) • checking that prepared pipes are the correct length 	
		1.5	Cut and prepare pipework, using two of the following: <ul style="list-style-type: none"> • saws (hand or power) • pipe/tube cutter • abrasive cloth 	

		<ul style="list-style-type: none"> • de-burring reamers • wire pipe cleaners 	
	1.6	Bend and form the pipes, using the appropriate tools and equipment for the type and size of pipes used	
	1.7	Use one of the following methods to bend and form the pipes: <ul style="list-style-type: none"> • bending springs • hand operated pipe bender • hydraulic pipe bending equipment • pipe expander • heating methods • swaging kit • fillers 	
	1.8	Produce pipework bends/forms that include two of the following: <ul style="list-style-type: none"> • angular bends • offsets • bridge sets • expansion loops • radii • external swaged ends • internal swaged ends 	
	1.9	Assemble and secure the pipework, using the correct fittings and pipe joining techniques	
	1.10	Produce pipework assemblies using one of the following types of pipe: <ul style="list-style-type: none"> • carbon steel • stainless steel • copper • brass • aluminium • plastic 	
	1.11	Assemble pipes, using one of the following methods: <ul style="list-style-type: none"> • compression fittings • snap-on/push fittings • screwed connections • soldered fittings • brazed fittings • cemented fittings • welded joints 	
	1.12	Assemble pipework using four of the following types of fitting:	

			<ul style="list-style-type: none"> • straight couplings • flanges • unions • elbows • reduction pieces • valves • tee pieces • drain/bleeding devices • blanking caps • screwed fittings (such as tank, tap, pump, gauges) 	
		1.13	Check the completed pipe assembly to ensure that all operations have been completed, and that the finished assembly meets the required specification	
		1.14	Produce pipework assemblies which comply with all of the following quality and accuracy standards: <ul style="list-style-type: none"> • pipes are bent to the appropriate shape/form and position • all pipe bends are free from buckling or deformation • appropriate fittings are used, and are secure and leak free • soldered and cemented fittings are free from excessive residues (where appropriate) • pipe assemblies are of the correct dimensions • the completed assembly meets the specific system requirements 	
		1.15	Report any difficulties or problems that may arise with the pipe fitting activities, and carry out any agreed actions	
		1.16	Leave the work area in a safe and tidy condition on completion of the assembly activities	
2.	Know how to carry out pipe fitting activities	2.1	Describe the health and safety requirements, and safe working practices and procedures required for the pipe fitting activities undertaken	
		2.2	Describe the importance of wearing appropriate protective clothing and equipment (PPE), and keeping the work area safe and tidy	
		2.3	Describe the hazards associated with the pipe fitting activities (such as handling long pipe lengths, using damaged or badly maintained tools and equipment, using pipe bending equipment, using heating and soldering equipment, using adhesives), and how they can be minimised	
		2.4	Describe the procedure for obtaining the required job instructions, drawings and other related specifications	
		2.5	State how to use and extract information from engineering drawings and related specifications (to include BS or ISO standard symbols and abbreviations, imperial and metric systems of measurement, workpiece reference points and system of tolerancing)	

	2.6	State how to determine the overall length of the pipework required, taking into account allowances for pipe fittings and, where appropriate, screwed connections	
	2.7	State the tools and equipment used in the cutting and preparing the pipes (such as saws, pipe and tube cutters)	
	2.8	State the methods used to hand bend and form the pipe (including the use of bending springs, hand bending machines, fillers, heating methods)	
	2.9	Describe how to produce the various bends required (such as angled bends, dog-leg sets, bridge sets and expansion loops)	
	2.10	State the preparation of pipework and fittings for the assembly operation (such as checking for damage, removing foreign objects, dirt and swarf from the bore of the pipe, removing burrs)	
	2.11	State the range of pipe fittings that can be used (such as straight connectors, elbows, tee pieces, reduction pieces, flanged fittings, valves, blanking pieces/cap ends), and how to identify them	
	2.12	State the different types of fitting available (such as screwed fittings, soldered fittings, compression fittings, push fit fittings and cemented fittings)	
	2.13	Describe methods used to seal screwed joints (such as tapes and sealing compounds)	
	2.14	State the methods used to prepare pipe ends and fittings for soldering or brazing, and why it is necessary to ensure that these preparations are carried out	
	2.15	State the various types of soldered connector available (such as solder ring types and capillary fittings)	
	2.16	State the methods used to solder the joints, and how to recognise when the fitting is correctly soldered on	
	2.17	State the precautions to be taken when using gas torches to form the joint, and the effect of overheating the joint	
	2.18	State the methods used to prepare pipe ends and fittings when using adhesives, and why it is necessary to ensure that these preparations are carried out	
	2.19	State the methods used to cement the joints, and how to recognise when the fitting is correctly secured	
	2.20	State the precautions to be taken when using the adhesives and sealing compounds (such as adequate ventilation, fume extraction, away from naked flames, avoiding skin contact)	
	2.21	State the use of compression fittings; how the pipes are sealed; and the effects of over tightening the fittings	
	2.22	State the use of push-fit connectors, and their advantages and disadvantages	
	2.23	Describe how to identify the correct orientation of fittings with regard to flow, and the consequences of incorrectly orientating the fitting	
	2.24	State the supporting methods that are used when assembling pipework	

		2.25	State the methods of testing pipework systems for leaks (using air, water or hydraulic testing methods)	
		2.26	Describe when to act on their own initiative and when to seek help and advice from others	
		2.27	State the importance of leaving the work area in a safe and clean condition on completion of the pipe fitting activities (such as returning hand tools and equipment to the designated location, cleaning the work area, and removing and disposing of waste)	



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Level 1 Unit – Using lathes for turning operations

Unit aim

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

The turning operations may be carried out on machines such as centre lathes, capstan or turret lathes, or other specific turning machines. The learner will be expected to prepare for the turning activities by obtaining all the necessary job instructions, materials, tools, equipment and any documentation that may be required.

In machining the workpieces, the learner will be required to work to instructions, to mount, position and set the workpiece, and to use cutting feeds and speeds and techniques appropriate to the type of material, tooling and operations performed. The learner will be expected to produce components that combine a number of different features, such as parallel, stepped and tapered diameters, drilled, bored and reamed holes.

During, and on completion of, the turning operations, the learner will be expected to check the quality of their work, using measuring equipment appropriate to the aspects being checked and the tolerances to be achieved. The learner will need to be able to recognise turning defects, to take appropriate action to put right any faults that occur, and to ensure that the finished workpiece is within the drawing requirements. On completion of the turning activities, the learner will be expected to leave the machine and work area in a safe and tidy condition.

Unit introduction

The learner's responsibilities will require them to comply with health and safety requirements and organisational policy and procedures for the turning activities undertaken. The learner will need to report any difficulties or problems that may arise, and to carry out any agreed actions. 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 produce.

The learner's knowledge will provide an understanding of their work and will enable them to apply appropriate turning techniques safely. The learner will understand the turning process, and its application, and will know about the equipment, materials and consumables, to the required depth to provide a sound basis for carrying out the activities to the required specification.

The learner will understand the safety precautions required when working with the lathe, and with its associated tools and equipment. 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

To achieve this unit, the learner needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria determine the standard required to achieve the unit through a variety of assessment methods appropriate to the delivery environment.

Unit Reference Number		K/504/6358
Qualification Framework		RQF
Title		Using lathes for turning operations
Unit Level		Level 1
Guided Learning Hours		63
Unit Credit Value		10
Unit Grading Structure		Pass / Fail

Learning Outcome		Assessment Criteria - The learner can		Criteria expansion
1.	Using lathes for turning operations	1.1	Work safely at all times, complying with health and safety legislation, regulations and other relevant guidelines	
		1.2	Carry out all of the following at all times during the turning activities: <ul style="list-style-type: none"> • adhere to procedures or systems in place for risk assessment, COSHH, personal protective equipment (PPE) and other relevant safety regulations • ensure that machine guards are in place and are correctly adjusted • ensure that components are held securely (without damage or distortion) • ensure that cutting tools are maintained in a suitable/safe condition • apply safe and appropriate turning techniques and procedures at all times • ensure that the work area is maintained and left in a safe and tidy condition 	
		1.3	Obtain and prepare the appropriate materials, tools and equipment	
		1.4	Use four of the following types of tool: <ul style="list-style-type: none"> • turning • facing • boring • knurling • parting-off • forming • recessing/grooving • chamfering • centre drills • twist/core drills • reamers • taps • dies 	

	1.5	Mount the workpiece safely and securely, in line with instructions	
	1.6	Mount, secure and machine components, using one of the following workholding devices: <ul style="list-style-type: none"> • three-jaw chucks • collet chucks • drive plate and centres • fixtures • magnetic or pneumatic devices • four-jaw chucks 	
	1.7	Set and adjust the machine tool speeds and feeds, in line with instructions	
	1.8	Use the machine tool controls safely and correctly, in line with operational procedures	
	1.9	Machine components made from one of the following types of material: <ul style="list-style-type: none"> • low carbon/mild steel • high carbon steel • aluminium/aluminium alloys • cast iron • brass/brass alloys • plastic/nylon/composite • other specific material 	
	1.10	Produce machined components which combine different operations and have features that cover six of the following: <ul style="list-style-type: none"> • flat faces • parallel diameters • stepped diameters • drilled holes • bored holes • profile forms • reamed holes • internal threads • external threads • chamfers or radii • tapered diameters • knurls or special finishes • grooves/undercuts • parting off 	
	1.11	Check that the finished components meet the standard required	
	1.12	Carry out checks for accuracy, to include three of the following: <ul style="list-style-type: none"> • external diameters 	

			<ul style="list-style-type: none"> • bore/hole size/fit • linear dimensions (lengths, depths) • surface finish 	
		1.13	Use three of the following types of measuring equipment during the machining and checking activities: <ul style="list-style-type: none"> • rules • external micrometers • gauges • surface finish equipment (such as comparison plates, machines) 	
		1.14	Produce components to all of the following quality and accuracy standards, as applicable to the operation: <ul style="list-style-type: none"> • components to be free from false tool cuts, burrs and sharp edges • dimensional tolerance +/- 0.25mm or +/- 0.010" • surface finish 63 µin or 1.6µm 	
		1.15	Report any difficulties or problems that may arise with the turning activities, and carry out any agreed actions	
		1.16	Shut down the equipment to a safe condition on completion of the machining activities	
2.	Know how to use lathes for turning operations	2.1	State the safe working practices and procedures to be followed when using lathes (such as ensuring correct isolation of the machine before mounting workholding devices; fitting and adjusting machine guards, ensuring that the workpiece is secure and that tooling is free from the workpiece before starting the machine)	
		2.2	State the hazards associated with the turning operations (such as revolving/moving parts of machinery, airborne and hot metal particles, sharp cutting tools, and burrs and sharp edges on components), and how they can be minimised	
		2.3	State the personal protective equipment (PPE) to be worn for the turning activities (such as correctly fitting overalls and safety glasses; ensuring that, if you have long hair, it is tied back or netted; and removing any jewellery or other items that can become entangled in the machinery)	
		2.4	State the safety mechanisms on the machine (such as emergency stop buttons, emergency treadle brakes), and the procedure for checking that they function correctly	
		2.5	State the correct operation of the machine controls in both hand and power modes; how to stop the machine in both normal and emergency situations, and the procedure for restarting after an emergency	
		2.6	State the importance of keeping the work area clean and tidy (such as cleaning the machine, disposal of waste, ensuring that any spilt cutting fluids are correctly dealt with)	
		2.7	Describe how to use and extract information from engineering drawings and related specifications (to include BS or ISO standard symbols and abbreviations, imperial and metric systems of measurement, workpiece reference points and system of tolerancing)	

	2.8	State the effects of clamping the workpiece in a chuck/workholding device, and how this can cause damage or distortion in the finished components	
	2.9	Describe how to check that cutting tools are in a safe and usable condition, and how to handle and store tools safely and correctly	
	2.10	State the effects of backlash in machine slides and screws, and how this can be overcome	
	2.11	State the techniques of taking trial cuts, and checking dimensional accuracy	
	2.12	State the application of roughing and finishing cuts, and the effect on tool life, surface finish and dimensional accuracy	
	2.13	State the type of cutting tool, cutting feeds and speeds to be used, and the depth of cut that can be taken	
	2.14	State the application of cutting fluids and compounds, and why some materials do not require cutting fluids to be used	
	2.15	Describe how to recognise machining faults, and how to identify when tools need re-sharpening	
	2.16	State the checks to be carried out on the components before removing them from the machine (such as have all operations been completed, dimensional checks, surface finish checks)	
	2.17	State the problems that can occur with the turning activities (such as defects caused by incorrectly ground or worn tools, inappropriate feeds/speeds, damage by workholding devices), and how these can be overcome	
	2.18	Describe when to act on their own initiative and when to seek help and advice from others	
	2.19	State the importance of leaving the machine in a safe condition on completion of activities (such as correctly isolated, cutting tools removed, cleaning the machine and removing and disposing of waste)	



Level 1 Unit – Using milling machines

Unit aim

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

The milling operations may be carried out on horizontal, vertical or universal milling machines. The learner will be expected to prepare for the milling activities by obtaining all the necessary job instructions, materials, tools, equipment and any documentation that may be required.

In machining the workpieces, the learner will be required to work to instructions, to mount, position and set the workpiece, and to use cutting feeds and speeds and techniques appropriate to the type of material, tooling and operations performed. The learner will be expected to produce components that combine a number of different features, such as flat faces, parallel faces, faces square to each other, angular faces, steps, open and enclosed slots, drilled holes and special forms/profiles.

During, and on completion of, the milling operations, the learner will be expected to check the quality of their work, using measuring equipment appropriate to the aspects being checked and the tolerances to be achieved. The learner will need to be able to recognise milling defects, to take appropriate action to put right any faults that occur, and to ensure that the finished workpiece is within the drawing requirements. On completion of the milling activities, the learner will be expected to leave the machine and work area in a safe and tidy condition.

Unit introduction

The learner's responsibilities will require them to comply with health and safety requirements and organisational policy and procedures for the milling activities undertaken. The learner will need to report any difficulties or problems that may arise, and to carry out any agreed actions. 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 produce.

The learner's knowledge will provide an understanding of their work and will enable them to apply appropriate milling techniques safely. The learner will understand the milling process, and its application, and will know about the equipment, materials and consumables, to the required depth to provide a sound basis for carrying out the activities to the required specification.

The learner will understand the safety precautions required when working with the milling machine, and with its associated tools and equipment. 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

To achieve this unit, the learner needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria determine the standard required to achieve the unit through a variety of assessment methods appropriate to the delivery environment.

Unit Reference Number		M/504/6359
Qualification Framework		RQF
Title		Using milling machines
Unit Level		Level 1
Guided Learning Hours		63
Unit Credit Value		10
Unit Grading Structure		Pass / Fail

Learning Outcome		Assessment Criteria - The learner can		Criteria expansion
1.	Using milling machines	1.1	Work safely at all times, complying with health and safety legislation, regulations and other relevant guidelines	
		1.2	Carry out all of the following at all times during the milling activities: <ul style="list-style-type: none"> • adhere to procedures or systems in place for risk assessment, COSHH, personal protective equipment (PPE) and other relevant safety regulations • ensure that machine guards are in place and correctly adjusted • ensure that components are held securely (without damage or distortion) • ensure that cutting tools are maintained in a suitable/safe condition • apply safe and appropriate milling techniques and procedures at all times • ensure that the work area is maintained and left in a safe and tidy condition 	
		1.3	Obtain and prepare the appropriate materials, tools and equipment	
		1.4	Use two of the following types of milling cutter/tool: <ul style="list-style-type: none"> • face mills • slab/cylindrical cutters • end mills • slot drills • side and face cutters • slot cutters • slitting saws • form cutters (such as vee or radius) • twist/core drills 	
		1.5	Mount the workpiece safely and securely, in line with instructions	

		1.6	Mount, secure and machine components, using one of the following workholding devices: <ul style="list-style-type: none"> • fixed vice • swivel or universal vice • fixtures • direct clamping to machine table • angle plates • vee block and clamps • magnetic or pneumatic devices • chucks • indexing device 	
		1.7	Set and adjust the machine tool speeds and feeds, in line with instructions	
		1.8	Use the machine tool controls safely and correctly, in line with operational procedures	
		1.9	Machine components made from one of the following types of material: <ul style="list-style-type: none"> • low carbon/mild steel • high carbon steel • aluminium/aluminium alloys • cast iron • brass/brass alloys • plastic/nylon/composite • other specific material 	
		1.10	Produce machined components which combine different operations and have features that cover six of the following: <ul style="list-style-type: none"> • flat faces • parallel faces • square faces • steps/shoulders • angular faces • open ended slots • enclosed slots • recesses • drilled holes • bored holes • tee slots • indexed or rotated forms • profile forms (such as vee, concave, convex, serrations) 	
		1.11	Check that the finished components meet the standard required	

		1.12	Carry out checks for accuracy, to include four of the following: <ul style="list-style-type: none"> • linear dimensions • flatness • squareness • surface finish • slots (such as position, width, depth) 	
		1.13	Use four of the following types of measuring equipment during the machining and checking activities: <ul style="list-style-type: none"> • rules • external micrometers • squares • Vernier callipers • gauges • protractors • surface finish equipment (such as comparison plates, machines) 	
		1.14	Produce components to all of the following quality and accuracy standards applicable to the operation: <ul style="list-style-type: none"> • components to be free from false tool cuts, burrs and sharp edges • dimensional tolerance +/- 0.25mm or +/- 0.010" • flatness and squareness within 0.125mm per 25mm or 0.005" per inch • surface finish 63 µin or 1.6µm • angles within +/- 1 degree 	
		1.15	Report any difficulties or problems that may arise with the milling activities, and carry out any agreed actions	
		1.16	Shut down the equipment to a safe condition on completion of the milling activities	
2.	Know how to use milling machines	2.1	State the safe working practices and procedures to be followed when preparing and using milling machines (such as ensuring the correct isolation of the machine before mounting cutters and workholding devices; fitting and adjusting machine guards, ensuring that the workpiece is secure and that cutters are free from the workpiece before starting the machine)	
		2.2	State the hazards associated with the milling operations (such as revolving/moving parts of machinery, airborne and hot metal particles, sharp cutting tools and burrs and sharp edges on component), and how they can be minimised	
		2.3	State the personal protective equipment (PPE) to be worn for the milling activities (such as correctly fitting overalls and safety glasses; ensuring that, if you have long hair, it is tied back or netted; and removing any jewellery or other items that can become entangled in the machinery)	

	2.4	State the safety mechanisms on the machine (such as emergency stop buttons, emergency brakes), and the procedure for checking that they function correctly	
	2.5	State the correct operation of the machine controls in both hand and power modes; how to stop the machine in both normal and emergency situations, and the procedure for restarting after an emergency	
	2.6	State the importance of keeping the work area clean and tidy (such as cleaning the machine, disposal of waste, ensuring that any spilt cutting fluids are correctly dealt with)	
	2.7	Describe how to use and extract information from engineering drawings and related specifications (to include BS or ISO standard symbols and abbreviations, imperial and metric systems of measurement, workpiece reference points and system of tolerancing)	
	2.8	State the effects of clamping the workpiece in a vice or other work holding device, and how this can cause damage or distortion in the finished components	
	2.9	State the various milling operations that can be performed, and the types of cutters that are used (such as face mills, slab/cylindrical cutters, side and face cutters, end mills, slot drills, form cutters, twist drills)	
	2.10	Describe how to position the workpiece in relation to the milling cutters, to give conventional or climb milling conditions	
	2.11	Describe how to check that the milling cutters to be used are in a safe and usable condition	
	2.12	State the effects of backlash in machine slides and screws, and how this can be overcome	
	2.13	State the techniques of taking trial cuts and checking dimensional accuracy	
	2.14	State the application of roughing and finishing cuts, and the effect on tool life, surface finish and dimensional accuracy	
	2.15	State the type of cutting tool, cutting feeds and speeds to be used, and the depth of cut that can be taken	
	2.16	State the application of cutting fluids and compounds, and why some materials do not require cutting fluids to be used	
	2.17	Describe how to recognise machining faults, and how to identify when cutters need re-sharpening	
	2.18	State the checks to be carried out on the components before removing them from the machine (such as have all operations been completed, dimensional checks, surface finish checks)	
	2.19	State the problems that can occur with the milling activities (such as defects caused by worn cutters, inappropriate feeds/speeds, damage by workholding devices), and how these can be overcome	
	2.20	Describe when to act on their own initiative and when to seek help and advice from others	
	2.21	State the importance of leaving the machine in a safe condition on completion of activities (such as correctly isolated, cutting tools removed, cleaning the machine and removing and disposing of waste)	

A large, stylized outline of the word 'eta' is centered on the page. The 'e' is outlined in a dark olive green, the 't' is outlined in black, and the 'a' is outlined in a light grey. The letters are thick and rounded, with a modern, clean aesthetic.

Level 1 Unit – Using grinding machines

Unit aim

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

The grinding operations may be carried out on horizontal or vertical surface grinding machines, cylindrical or universal grinding machines. The learner will be expected to prepare for the grinding activities by obtaining all the necessary job instructions, materials, tools, equipment and any documentation that may be required.

In grinding the workpieces, the learner will be required to work to instructions, to mount, position and set the workpiece, and to use grinding feeds, speeds and techniques appropriate to the type of material, type of grinding wheel and operations performed. The learner will be expected to grind components that combine a number of different features, such as flat faces, parallel faces, faces square to each other, angular faces, steps and slots, or parallel, stepped and tapered diameters, faces, bores and special forms/profiles.

During, and on completion of, the grinding operations, the learner will be expected to check the quality of their work, using measuring equipment appropriate to the aspects being checked and the tolerances to be achieved. The learner will need to be able to recognise grinding defects, to take appropriate action to put right any faults that occur, and to ensure that the finished workpiece is within the drawing requirements. On completion of the grinding activities, the learner will be expected to leave the machine and work area in a safe and tidy condition.

Unit introduction

The learner's responsibilities will require them to comply with health and safety requirements and organisational policy and procedures for the grinding activities undertaken. The learner will need to report any difficulties or problems that may arise, and to carry out any agreed actions. 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 an understanding of their work and will enable them to apply appropriate grinding techniques safely. The learner will understand the grinding process, and its application, and will know about the equipment, materials and consumables, to the required depth to provide a sound basis for carrying out the activities to the required specification.

The learner will understand the safety precautions required when working with the grinding machine, and with its associated tools and equipment. 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

To achieve this unit, the learner needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria determine the standard required to achieve the unit through a variety of assessment methods appropriate to the delivery environment.

Unit Reference Number		H/504/6360
Qualification Framework		RQF
Title		Using grinding machines
Unit Level		Level 1
Guided Learning Hours		63
Unit Credit Value		10
Unit Grading Structure		Pass / Fail

Learning Outcome		Assessment Criteria - The learner can		Criteria expansion
1.	Using grinding machines	1.1	Work safely at all times, complying with health and safety legislation, regulations and other relevant guidelines	
		1.2	Ensure that the learner applies all of the following checks and practices at all times during the grinding activities: <ul style="list-style-type: none"> • adhere to procedures or systems in place for risk assessment, COSHH, personal protective equipment (PPE) and other relevant safety regulations • ensure that machine guards are in place and are correctly adjusted • ensure that components are held securely (without damage or distortion) • ensure that grinding wheels are maintained in a suitable/safe condition • apply safe and appropriate grinding techniques and procedures at all times • ensure that the work area is maintained and left in a safe and tidy condition 	
		1.3	Obtain and prepare the appropriate materials, tools and equipment	
		1.4	Mount the workpiece safely and securely, in line with instructions	
		1.5	Grind components mounted on one of the following workholding devices: <ul style="list-style-type: none"> • magnetic chuck or blocks • fixed vice • swivel or universal vice • angle plates • vee block and clamps • fixtures • chucks • centres • mandrels 	

	1.6	Set and adjust the machine tool speeds and feeds, in line with instructions (where appropriate)	
	1.7	Prepare grinding wheels, to include carrying out one of the following: <ul style="list-style-type: none"> • dressing and 'trueing up' grinding wheels • wheel forming (such as chamfers, radii, angular forms, profiles) • relieving the wheel sides 	
	1.8	Use the machine tool controls safely and correctly, in line with operational procedures	
	1.9	Grind components made from one of the following types of material: <ul style="list-style-type: none"> • low carbon/mild steel • high carbon steel • aluminium/aluminium alloys • cast iron • brass/brass alloys • plastic/nylon/composite • other specific material 	
	1.10	Grind components which combine different operations and have features that cover three of the following: <ul style="list-style-type: none"> • flat faces • parallel faces • faces square to each other • vertical faces • angular faces • steps and shoulders • slots • parallel diameters • stepped diameters • tapered diameters • counterbores • tapered bores • parallel bores • profile forms 	
	1.11	Check that the finished components meet the standard required	
	1.12	Carry out checks for accuracy, to include all of the following: <ul style="list-style-type: none"> • dimensions • parallelism • surface texture 	

		1.13	Use all of the following measuring equipment during the grinding and checking activities: <ul style="list-style-type: none"> external micrometers surface finish equipment (such as comparison plates, machines) 	
		1.14	Produce components to all of the following quality and accuracy standards, as applicable to the operation: <ul style="list-style-type: none"> components to be free from false grinding cuts, wheel marks, burrs and sharp edges general dimensional tolerance +/- 0.1mm or +/- 0.004" flatness and squareness within 0.025mm per 25mm or 0.001" per inch surface texture 16 µin or 0.4µm 	
		1.15	Report any difficulties or problems that may arise with the grinding activities, and carry out any agreed actions	
		1.16	Shut down the equipment to a safe condition on completion of the grinding activities	
2.	Know how to Use grinding machines	2.1	State the safe working practices and procedures to be followed when preparing and using grinding machines (such as ensuring the correct isolation of the machine before mounting the workholding devices and workpiece; fitting and adjusting machine guards and dust extraction equipment, ensuring that the workpiece is secure, and that grinding wheels are free from damage and are clear of the workpiece before starting the machine)	
		2.2	State the hazards associated with the grinding operations (such as revolving/moving parts of machinery, sparks/airborne particles, bursting grinding wheels, insecure components, burrs and sharp edges on components), and how they can be minimised	
		2.3	State the personal protective equipment (PPE) to be worn for the grinding activities (such as correctly fitting overalls and safety glasses; ensuring that, if you have long hair, it is tied back or netted; and removing any jewellery or other items that can become entangled in the machinery)	
		2.4	State the safety mechanisms on the machine, and the procedure for checking that they function correctly	
		2.5	State the correct operation of the machine controls in both hand and power modes; how to stop the machine in both normal and emergency situations, and the procedure for restarting after an emergency	
		2.6	State the importance of keeping the work area clean and tidy (such as cleaning the machine, disposal of waste, ensuring any spilt cutting fluids are correctly dealt with)	
		2.7	Describe how to use and extract information from engineering drawings and related specifications (to include BS or ISO standard symbols and abbreviations, imperial and metric systems of measurement, workpiece reference points and system of tolerancing)	
		2.8	Describe how to mount the workpiece in the workholding devices (such as magnetic chucks and blocks, vices, angle plates, fixtures, centres, mandrels, collets and chucks)	

	2.9	State the effects of clamping the workpiece in a chuck/work holding device, and how this can cause damage or distortion in the finished components	
	2.10	Describe how to check that the grinding wheels are in a safe and serviceable condition (such as free from damage, cracks, correctly balanced)	
	2.11	State the need for 'trueing up' and dressing of wheels to prevent glazing and burning of the workpiece, and methods of forming the wheels to the required profile (such as use of pantograph, diamond dressing units)	
	2.12	State the effects of backlash in machine slides and screws, and how this can be overcome	
	2.13	State the techniques of taking trial cuts and checking dimensional accuracy	
	2.14	State the application of roughing and finishing cuts, and the effect on tool life, surface finish and dimensional accuracy	
	2.15	State the types of grinding wheels, cutting feeds and speeds to be used, and the depth of cut that can be taken	
	2.16	State the application of cutting fluids with regard to a range of different materials, and why some materials do not require cutting fluids to be used	
	2.17	Describe how to recognise grinding faults, and how to identify when grinding wheels need dressing	
	2.18	State the checks to be carried out on the components before removing them from the machine (such as have all operations been completed, dimensional checks, surface finish checks)	
	2.19	State the problems that can occur with the grinding activities (such as defects caused by glazed wheels, inappropriate feeds/speeds, damage by workholding devices), and how these can be overcome	
	2.20	Describe when to act on their own initiative and when to seek help and advice from others	
	2.21	State the importance of leaving the machine in a safe condition on completion of activities (such as correctly isolated, cleaning the machine, and removing and disposing of waste)	



Level 1 Unit – Carrying out sheet metal cutting, forming and assembly activities

Unit aim

This unit covers the skills and knowledge needed to prove the competences required for basic sheet (up to and including 3 mm) metalworking that will prepare the learner for entry into the engineering or manufacturing sectors, creating a progression between education and employment, or that will provide a basis for the development of additional skills and occupational competences in the working environment.

The learner will be expected to prepare for the sheet metalworking activities by obtaining all the necessary job instructions, materials, tools, equipment and any documentation that may be required.

In producing the sheetmetal components, the learner will be expected to use appropriate tools and equipment to mark out the material for a range of features to be produced, and then to use hand tools, portable power tools and simple machines to produce a variety of shapes, profiles and forms. The learner will also be expected to produce simple sheet metal assemblies, using self-secured joints, thermal methods or mechanical fastening devices. On completion of the sheet metalworking activities, the learner will be expected to return all tools and equipment to the correct location, and to leave the work area in a safe and tidy condition.

Unit introduction

The learner's responsibilities will require you to comply with health and safety requirements and organisational policy and procedures for the sheet metalworking activities undertaken. The learner will need to report any difficulties or problems that may arise, and to carry out any agreed actions. 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 an understanding of their work and will enable them to apply appropriate sheet metalworking techniques and procedures safely. The learner will understand the sheet metal cutting, forming and assembly process, and its application, and will know about the equipment, materials and consumables, to the required depth to provide a sound basis for carrying out the activities to the required specification.

The learner will understand the safety precautions required when carrying out the sheet metalworking activities, and when using the various tools and equipment, especially guillotines and bending/forming equipment. 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

To achieve this unit, the learner needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria determine the standard required to achieve the unit through a variety of assessment methods appropriate to the delivery environment.

Unit Reference Number		T/504/6363
Qualification Framework		RQF
Title		Carrying out sheet metal cutting, forming and assembly activities
Unit Level		Level 1
Guided Learning Hours		63
Unit Credit Value		10
Unit Grading Structure		Pass / Fail

Learning Outcome		Assessment Criteria - The learner can		Criteria expansion
1.	Carrying out sheet metal cutting, forming and assembly activities	1.1	Work safely at all times, complying with health and safety legislation, regulations and other relevant guidelines	
		1.2	Carry out all of the following during the sheet metalworking activities: <ul style="list-style-type: none"> • adhere to procedures or systems in place for risk assessment, COSHH, personal protective equipment (PPE) and other relevant safety regulations • ensure that all power tool cables, extension leads or air supply hoses are in a tested and serviceable condition • apply safe and appropriate sheet metal cutting and forming techniques and procedures at all times • return all tools and equipment to the correct location on completion of the sheet metalworking activities 	
		1.3	Obtain the appropriate tools and equipment for the sheet metalworking operations, and check that they are in a safe and usable condition	
		1.4	Mark out the components for the required operations, using appropriate tools and techniques	
		1.5	Use marking-out methods and techniques, including one of the following: <ul style="list-style-type: none"> • direct marking using instruments • use of templates • tracing/transfer methods 	
		1.6	Use a range of marking-out equipment, to include five of the following: <ul style="list-style-type: none"> • scribe • punch • rule or tape • straight edge 	

		<ul style="list-style-type: none"> • square • protractor • dividers or trammels • chalk, bluing or paint 	
	1.7	<p>Mark out material, to include four of the following features:</p> <ul style="list-style-type: none"> • datum and centre lines • square/rectangular profiles • angles • circles • curved profiles • cutting and bending detail (including allowances) • hole centring and outlining (such as circular or linear) 	
	1.8	<p>Cut and shape the materials to the required specification, using appropriate tools and techniques</p>	
	1.9	<p>Cut and finish material to the marked-out shape, using two of the following hand tools:</p> <ul style="list-style-type: none"> • tin snips • hacksaw • hand power tools (such as drill, nibbling, saw) • trepanning • bench shears • files • pneumatic tools • thermal device • other specific tool 	
	1.10	<p>Cut and finish material to the marked-out shape, using one of the following machine tools:</p> <ul style="list-style-type: none"> • guillotine • pillar drill • punch/cropping machine • nibbling machine • mechanical saw 	
	1.11	<p>Perform cutting operations to produce components that have three of the following shapes:</p> <ul style="list-style-type: none"> • square or rectangular profiles • angled profiles • external curved contours • notches • internal curved contours • round holes 	

		<ul style="list-style-type: none"> • square holes 	
	1.12	<p>Carry out forming operations, to produce sheet metal components that have three of the following shapes:</p> <ul style="list-style-type: none"> • bends or flanges • folds/safe edges • wired edges • swages • curved panels • tray/box sections • cylindrical sections • cowlings and rounded covers • square to round trunking 	
	1.13	<p>Use two of the following types of sheet metal forming equipment/techniques:</p> <ul style="list-style-type: none"> • bending machine (hand or powered) • rolling machine (hand or powered) • hammers/panel beating equipment • presses • stakes and formers • jenny/wiring machine • wheeling machine • swaging machine • shrinking techniques • stretching techniques 	
	1.14	<p>Use the appropriate methods and techniques to assemble and secure the components in their correct positions</p>	
	1.15	<p>Assemble sheet metal components using one of the following methods:</p> <ul style="list-style-type: none"> • temporary tack welding • soldering or brazing • resistance spot welding • riveting (such as hollow or solid) • adhesive bonding • flanged and mechanically fastened (such as bolts, screws) • self-securing joints (such as knocked up, paned down, swaged, joggled) 	
	1.16	<p>Use sheet metal (up to and including 3 mm) in one appropriate material from the following:</p> <ul style="list-style-type: none"> • hot rolled mild steel • cold rolled mild steel • coated mild steel (such as primed, tinned, galvanised) 	

			<ul style="list-style-type: none"> • stainless steel • aluminium • brass • copper • lead • titanium 	
		1.17	Check that the finished components meet the standard required	
		1.18	Produce sheet metal components which meet all of the following: <ul style="list-style-type: none"> • all dimensions are within +/- 3.0mm or +/- 0.125" • finished components are correctly formed and meet the required shape/geometry (square, straight, angles free from twists) • completed components are free from excessive tool or bending marks, stretching or distortion, cracking, sharp edges, slivers or burrs • all components are correctly assembled and have secure and firm joints 	
		1.19	Report any difficulties or problems that may arise with the sheet metal activities, and carry out any agreed actions	
		1.20	Leave the work area in a safe and tidy condition on completion of the sheet metal activities	
2.	Know how to carry out sheet metal cutting, forming and assembly activities	2.1	State the health and safety requirements, and safe working practices and procedures required for the sheet metalworking activities undertaken	
		2.2	State the personal protective clothing and equipment (PPE) to be worn when carrying out the sheet metal activities (such as leather gloves, eye protection, ear protection), and the importance of keeping the work area safe and tidy	
		2.3	Describe how to handle sheet materials safely and correctly and the need to wear gloves and other related safety equipment	
		2.4	Describe safe working practices and procedures to be observed when using manual and power operated tools	
		2.5	State the hazards associated with carrying out sheet metalworking activities (such as handling sheet materials, using dangerous or badly maintained tools and equipment, operating guillotines and bending machines, and when using hand and bench shears), and how they can be minimised	
		2.6	State the procedure for obtaining the required drawings, job instructions and other related specifications	
		2.7	Describe how to use and extract information from engineering drawings and related specifications (to include BS or ISO standard symbols and abbreviations, imperial and metric systems of measurement, workpiece reference points and system of tolerancing)	
		2.8	Describe how to prepare the materials in readiness for the marking out activities, in order to enhance clarity, accuracy and safety (such as visually checking for defects, cleaning the materials, removing burrs and sharp edges, applying a marking-out medium)	

	2.9	Describe how to select and establish a suitable datum; the importance of ensuring that marking out is undertaken from the selected datum, and the possible effects of working from a different datum	
	2.10	State the methods of marking out cutting guidelines, square and rectangular profiles, circular and radial profiles, angles and hole positions	
	2.11	Describe ways of laying out the marking-out shapes or patterns to maximise use of materials	
	2.12	Describe how to cut sheet metal (using such tools as tin snips, bench shears, guillotines, portable power tools, bench drills, saws)	
	2.13	Describe how to form sheet metal (using such tools and equipment as hammers, mallets, stakes, formers, sand bags folding and rolling machines)	
	2.14	State the various forming operations that can be carried out (such as bends, box sections, cylinders and curved sections, safe/folded edges, wired edges and swages)	
	2.15	State the importance of using tools or equipment only for the purpose intended; the care that is required when using the tools or equipment	
	2.16	State the various methods of securing the assembled components, and the range of mechanical fastening devices that are used (such as nuts and bolts, screws, rivets, special fasteners, resistance and tack welding methods and techniques, adhesive bonding of components, and self-secured joints such as knocked up, paned down, swaged and joggled)	
	2.17	State the preparations to be carried out on the components prior to assembling them	
	2.18	Describe how to set up and align the various components, and the tools and equipment that is used	
	2.19	Describe methods of temporarily holding the joints together to aid the assembly activities (clamps, rivet clamps)	
	2.20	State the problems that can occur with the sheet metalworking activities (such as defects caused by incorrectly set or blunt shearing blades), and how these can be overcome	
	2.21	Describe when to act on their own initiative and when to seek help and advice from others	
	2.22	State the importance of leaving the work area in a safe and clean condition on completion of activities (such as removing and storing power leads, isolating machines, cleaning the equipment, and removing and disposing of waste)	



Level 1 Unit – Cutting and shaping platework components

Unit aim

This unit covers the skills and knowledge needed to prove the competences required for basic heavy platework (above 3 mm) that will prepare the learner for entry into the engineering or manufacturing sectors, creating a progression between education and employment, or that will provide a basis for the development of additional skills and occupational competences in the working environment.

The learner will be expected to prepare for the plateworking activities by obtaining all the necessary job instructions, materials, tools, equipment and any documentation that may be required.

In producing the platework components, the learner will be expected to use appropriate tools and equipment to mark out the material for a range of features to be produced, and then to use hand tools, portable power tools and simple machines to produce a variety of shapes, profiles and forms. The learner will also be expected to produce simple platework assemblies, using mechanical fastening devices and tack welding. On completion of the plateworking activities, the learner will be expected to return all tools and equipment to the correct location, and to leave the work area in a safe and tidy condition.

Unit introduction

The learner's responsibilities will require them to comply with health and safety requirements and organisational policy and procedures for the plateworking activities undertaken. The learner will need to report any difficulties or problems that may arise, and to carry out any agreed actions. 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 an understanding of their work and will enable them to apply appropriate plateworking techniques and procedures safely. The learner will understand the cutting, forming and assembly processes, and their application, and will know about the tools and equipment used, to the required depth to provide a sound basis for carrying out the activities to the required specification.

The learner will understand the safety precautions required when carrying out the plateworking activities, and when using the various tools and equipment, especially guillotines and bending/forming equipment. 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

To achieve this unit, the learner needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria determine the standard required to achieve the unit through a variety of assessment methods appropriate to the delivery environment.

Unit Reference Number		A/504/6364
Qualification Framework		RQF
Title		Cutting and shaping platework components
Unit Level		Level 1
Guided Learning Hours		63
Unit Credit Value		10
Unit Grading Structure		Pass / Fail

Learning Outcome		Assessment Criteria - The learner can		Criteria expansion
1.	Cutting and shaping platework components	1.1	Work safely at all times, complying with health and safety legislation, regulations and other relevant guidelines	
		1.2	Carry out all of the following during the plateworking activities: <ul style="list-style-type: none"> • adhere to procedures or systems in place for risk assessment, COSHH, personal protective equipment (PPE) and other relevant safety regulations • ensure that all power tool cables, extension leads or air supply hoses are in a tested and serviceable condition • apply safe and appropriate platework cutting and forming techniques and procedures at all times • return all tools and equipment to the correct location on completion of the plateworking activities 	
		1.3	Obtain the appropriate tools and equipment for the plateworking operations, and check that they are in a safe and usable condition	
		1.4	Mark out the components for the required operations, using appropriate tools and techniques	
		1.5	Use marking-out methods and techniques, including one of the following: <ul style="list-style-type: none"> • direct marking using instruments • use of templates • tracing/transfer methods • other specific method 	
		1.6	<ul style="list-style-type: none"> • Use a range of marking-out equipment, to include five of the following: • scribe • punch • rule or tape 	

		<ul style="list-style-type: none"> • straight edge • square • protractor • dividers or trammels • chalk, bluing or paint 	
1.7	Mark out material to include four of the following features: <ul style="list-style-type: none"> • datum and centre lines • square/rectangular profiles • angles • circles • curved profiles • cutting and bending detail (including allowances) • hole centring and outlining (such as circular or linear) 		
1.8	Cut and shape the materials to the required specification, using appropriate tools and techniques		
1.9	Cut and finish material to the marked-out shape, using two of the following: <ul style="list-style-type: none"> • guillotine • abrasive disc • cropping machine • drill (such as bench, pillar, radial) • machine saw • thermal cutting equipment (such as hand held or machine) 		
1.10	Perform cutting operations to produce components that combine operations and cover three of the following features: <ul style="list-style-type: none"> • component with parallel sides • components with angled sides • bevel edges or weld preps • components with sides square to each other • components with curved contours • holes linearly pitched • holes radially pitched 		
1.11	Use one of the following types of forming equipment/techniques: <ul style="list-style-type: none"> • bending machine (hand or powered) • rolling machine (hand or powered) • presses • heating techniques 		

		1.12	Carry out forming operations to produce components that cover two of the following features: <ul style="list-style-type: none"> • bends at 90° • bends of various angles • flattening or straightening plate • producing curved plates/sections • cylinders 	
		1.13	Use the appropriate methods and techniques to assemble and secure the components in their correct positions	
		1.14	Assemble platework components, using one of the following methods: <ul style="list-style-type: none"> • temporary tack welding • riveting (hot or cold) • mechanically fastened (such as bolts, screws) 	
		1.15	Use two of the following materials: <ul style="list-style-type: none"> • flat plate • pipe/tube • rolled sections (angle, channel, RSJ, rail section) • solid bar (such as square, round, hexagonal) 	
		1.16	Check that the finished components meet the standard required	
		1.17	Produce platework components which meet all of the following: <ul style="list-style-type: none"> • all dimensions are within +/- 3.0mm or +/- 0.125" • finished components meet the required shape/geometry (such as square, straight, angles free from twists) • completed components are free from excessive tooling marks, deformation, cracking, sharp edges, slivers or burrs • all components are correctly assembled and have secure and firm joints 	
		1.18	Report any difficulties or problems that may arise with the platework activities, and carry out any agreed actions	
		1.19	Leave the work area in a safe and tidy condition on completion of the platework activities	
2.	Know how to cut and shape platework components	2.1	State the health and safety requirements, and safe working practices and procedures required for the plateworking activities undertaken	
		2.2	State the personal protective clothing and equipment (PPE) to be worn when carrying out the plateworking activities (such as leather gloves, eye protection, ear protection), and the importance of keeping the work area safe and tidy	
		2.3	Describe how to handle plate and section materials safely and correctly, and the need to wear gloves and other related safety equipment	

	2.4	State the hazards associated with carrying out heavy plateworking activities (such as handling sheet materials, using dangerous or badly maintained tools and equipment, operating guillotines, cropping and bending machines, and when using power saws, drilling machines and abrasive cutting discs), and how they can be minimised	
	2.5	State the procedure for obtaining the required drawings, job instructions and other related specifications	
	2.6	Describe how to use and extract information from engineering drawings and related specifications (to include BS or ISO standard symbols and abbreviations, imperial and metric systems of measurement, workpiece reference points and system of tolerancing)	
	2.7	Describe how to prepare the materials in readiness for the marking-out activities, in order to enhance clarity, accuracy and safety (such as visually checking for defects, cleaning the materials, removing burrs and sharp edges, applying a marking-out medium)	
	2.8	Describe how to select and establish a suitable datum; the importance of ensuring that marking out is undertaken from the selected datum, and the possible effects of working from a different datum	
	2.9	State the methods of marking out cutting guidelines, square and rectangular profiles, circular and radial profiles, angles and hole positions using templates or marking-out equipment	
	2.10	Describe ways of laying out the marking-out shapes or patterns to maximise the use of materials	
	2.11	Describe how to cut platework and section materials (such as using guillotines, cropping machines, abrasive discs, drilling machines, machine saws and thermal cutting equipment)	
	2.12	Describe how to form platework and section materials (such as using heating techniques, hammers and flanging bars, rolls and bending machines)	
	2.13	Describe how to produce holes in platework and section materials (using portable and bench/pedestal drilling machines and radial arm machines)	
	2.14	Describe how to hold platework materials for cutting operations (such as clamping for drilling, holding work when using portable grinders)	
	2.15	State the safety mechanisms and devices that are on the machines, and why they must always be used (such as machine guards, interlocks, safety operating devices)	
	2.16	State the various methods of securing the assembled components; the range of mechanical fastening devices that are used (such as nuts and bolts, rivets, tack welding methods and techniques)	
	2.17	State the preparations to be carried out on the components prior to assembling them	
	2.18	Describe methods of temporarily holding the joints together to aid the assembly activities	
	2.19	State the problems that can occur with the plateworking activities (such as defects caused by incorrectly set or blunt shearing blades), and how these can be overcome	
	2.20	Describe when to act on their own initiative and when to seek help and advice from others	

		2.21	State the importance of leaving the work area in a safe and clean condition on completion of activities (such as removing and storing power leads, isolating machines, cleaning the equipment, and removing and disposing of waste)	
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Level 1 Unit – Using oxy-fuel gas cutting equipment

Unit aim

This unit covers the skills and knowledge needed to prove the competences required for cutting and shaping plate (3mm thickness and above), rolled sections, pipe and tube using oxy-fuel gas cutting equipment. This will prepare the learner for entry into the engineering or manufacturing sectors, creating a progression between education and employment, or it will provide a basis for the development of additional skills and occupational competences in the working environment.

The oxy-fuel cutting will include equipment such as hand-held oxy-fuel gas cutting equipment, simple portable machines running on tracks and fixed bench cutting machines.

In carrying out the cutting activities, the learner will need to ensure that the equipment is correctly set up and that the flame is adjusted to give the correct cutting conditions. Cuts will include straight cuts, guided cuts, vertical cuts, square/rectangular profiles, angular and curved profiles, round and square holes, as appropriate. The learner will be expected to prepare for the cutting activities by obtaining all the necessary job instructions, materials, tools, equipment and any documentation that may be required. On completion of the oxy-fuel cutting activities, the learner will be expected to return all tools and equipment to the correct location, and to leave the equipment and work area in a safe and tidy condition.

Unit introduction

The learner's responsibilities will require you to comply with health and safety requirements and organisational policy and procedures for the oxy-fuel cutting activities undertaken. The learner will need to report any difficulties or problems that may arise, and to carry out any agreed actions. 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 an understanding of their work and will enable them to apply appropriate oxy-fuel cutting techniques and procedures safely.

The learner will understand the cutting process, and its application, and will know about the tools and equipment used, to the required depth to provide a sound basis for carrying out the activities to the required specification.

The learner will understand the safety precautions required when carrying out the oxy-fuel cutting activities, and when using the various tools and equipment (especially those involved in lighting up and closing down of the equipment and with regard to fire and potential explosion), and the safeguards necessary for undertaking the activities safely and correctly. 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

To achieve this unit, the learner needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria determine the standard required to achieve the unit through a variety of assessment methods appropriate to the delivery environment.

Unit Reference Number		F/504/6365
Qualification Framework		RQF
Title		Using oxy-fuel gas cutting equipment
Unit Level		Level 1
Guided Learning Hours		63
Unit Credit Value		10
Unit Grading Structure		Pass / Fail

Learning Outcome		Assessment Criteria - The learner can		Criteria expansion
1.	Using oxy-fuel gas cutting equipment	1.1	Work safely at all times, complying with health and safety legislation, regulations and other relevant guidelines	
		1.2	Prepare for the oxy-fuel gas cutting process, to include carrying out all of the following: <ul style="list-style-type: none"> • adhere to procedures or systems in place for risk assessment, COSHH, personal protective equipment (PPE) and other relevant safety regulations • check that regulators, hoses and valves are securely connected and free from leaks and damage • check that the correct gas nozzle is fitted to the cutting torch • ensure that a flashback arrestor is fitted to the gas equipment • ensure that appropriate gas pressures are set • use the correct procedure for lighting, adjusting and extinguishing the cutting flame • ensure that hoses are safely routed and protected at all times • ensure that gas cylinders are handled and stored safely and correctly (where appropriate) • prepare the work area for the cutting activities (such as positioning screens and fume extraction, ensuring that there are no combustible materials in the near vicinity) 	
		1.3	Obtain the appropriate tools and equipment for the oxy-fuel gas cutting operations, and check that they are in a safe and usable condition	
		1.4	Check that the oxy-fuel gas cutting equipment is set up for the operations to be performed	
		1.5	Where appropriate, mark out the components for the required operations, using appropriate tools and techniques	

	1.6	Operate the oxy-fuel gas cutting equipment to produce items/cut shapes to the dimensions and profiles specified	
	1.7	Use one of the following types of oxy-fuel gas cutting methods: <ul style="list-style-type: none"> • hand-held oxy-fuel gas cutting equipment • simple, portable, track-driven cutting equipment (electrical or mechanical) • fixed bench gas cutting equipment 	
	1.8	Perform cutting operations, to include three of the following: <ul style="list-style-type: none"> • down-hand straight cuts (freehand) • making straight cuts (track guided) • cutting regular shapes • cutting irregular shapes • making angled cuts • cutting chamfers • making radial cuts • gouging/flushing • bevelled edge – weld preparations • cutting out holes 	
	1.9	Produce thermal cuts in two of the following forms of material (metal of 3mm and above): <ul style="list-style-type: none"> • plate • rolled sections • pipe/tube • solid bars 	
	1.10	Produce cut profiles for one type of material from the following: <ul style="list-style-type: none"> • mild steel • high tensile/special steel • stainless steel • other appropriate metal 	
	1.11	Check that the finished components meet the standard required	
	1.12	Produce thermally-cut components which meet all of the following: <ul style="list-style-type: none"> • dimensional accuracy is within the tolerances specified on the drawing/specification, or within +/- 3mm • angled/radial cuts are within specification requirements • cuts are clean and smooth and free from flutes 	
	1.13	Report any difficulties or problems that may arise with the cutting activities, and carry out any agreed actions	
	1.14	Shut down the equipment to a safe condition on conclusion of the cutting activities	
	1.15	Leave the work area in a safe and tidy condition on completion of the cutting activities	

2.	Know how to use oxy-fuel gas cutting equipment	2.1	State the specific safety precautions to be taken when working with oxy-fuel gas cutting equipment in a fabrication environment (including general workshop safety; protecting other workers by siting protective screens; fire and explosion prevention; safety in enclosed/confined spaces; fume control)	
		2.2	State the personal protective clothing and equipment (PPE) to be worn when working with gas cutting equipment (such as leather aprons and gloves, eye protection)	
		2.3	State the hazards associated with carrying out gas cutting activities (including trailing hoses, naked flames, fumes and gases, explosive gas mixtures, oxygen enrichment, spatter, hot metal, enclosed spaces), and how they can be minimised	
		2.4	Describe safe working practices and procedures for using thermal equipment, in line with British Compressed Gas Association (BCGA) codes of practice (to include setting up procedures and emergency shutdown procedures)	
		2.5	State the procedure for obtaining the required drawings, job instructions and other related specifications	
		2.6	Describe how to use and extract information from engineering drawings and related specifications (to include BS or ISO standard symbols and abbreviations, imperial and metric systems of measurement, workpiece reference points and system of tolerancing)	
		2.7	State the various types of gas cutting equipment available (such as handheld, portable track driven, fixed machine)	
		2.8	State the accessories that can be used with handheld gas cutting equipment to aid cutting operations (such as cutting guides, trammels, templates)	
		2.9	Describe how to identify the gases used in the cutting process, and the colour coding of gas cylinders	
		2.10	Describe preparations prior to cutting (including checking connections for leaks, setting gas pressures, setting up the material/workpiece, and checking the cleanliness of materials used)	
		2.11	State the holding methods that are used to aid thermal cutting, and the equipment that can be used	
		2.12	State the correct procedure for lighting and extinguishing the flame (to include lighting the cutting torch and adjusting gas controls to produce a neutral flame; methods of starting the cut and controlling the cutting speed, direction and angle of cut; the procedure for extinguishing the flame, and the importance of following the procedure)	
		2.13	State the problems that can occur with thermal cutting, and how they can be avoided (including causes of distortion during thermal cutting and methods of controlling distortion)	
		2.14	State the effects of oil, grease, scale or dirt on the cutting process	
		2.15	State the causes of cutting defects, how to recognise them, and methods of correction and prevention	
		2.16	Describe when to act on their own initiative and when to seek help and advice from others	

		2.17	State the importance of leaving the work area in a safe and clean condition on completion of activities (such as safely storing gas cylinders and cutting equipment, removing and disposing of waste)	
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Level 1 Unit – Using manual metal arc welding equipment

Unit aim

This unit covers the skills and knowledge needed to prove the competences required for carrying out basic manual metal arc (MMA) welding that will prepare the learner for entry into the engineering or manufacturing sectors, creating a progression between education and employment, or that will provide a basis for the development of additional skills and occupational competences in the working environment.

The learner will be expected to prepare for the MMA welding activities by obtaining all the necessary job instructions, materials, tools, equipment and any documentation that may be required. The learner will also be expected to check the welding equipment and to ensure that all the leads/cables, electrode holder and workpiece earthing arrangements are securely connected and free from damage.

In preparing to weld, the learner will need to set and adjust the welding conditions, in line with instructions and/or the welding procedure specification. The learner must operate the equipment safely and correctly and make any necessary adjustments to settings in line with their permitted authority, in order to produce the welded joints to the required specification.

The learner will need to be able to recognise basic welding defects, to take appropriate action to limit any faults that occur and to ensure that the finished workpiece is within the specification requirements. On completion of the welding activities, the learner will be expected to return the workholding devices to their designated location, and to leave the welding equipment and work area in a safe and tidy condition.

Unit introduction

The learner's responsibilities will require them to comply with health and safety requirements and organisational policy and procedures for the manual metal arc welding activities undertaken. The learner will need to report any difficulties or problems that may arise, and to carry out any agreed actions. 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 an understanding of their work and will enable them to apply appropriate manual metal arc welding techniques and procedures safely. The learner will understand the welding process, and its application, and will know about the equipment, materials and consumables used, to the required depth to provide a sound basis for carrying out the activities to the required specification.

The learner will understand the safety precautions required when working with the manual metal arc welding equipment, and with its associated tools and equipment. 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

To achieve this unit, the learner needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria determine the standard required to achieve the unit through a variety of assessment methods appropriate to the delivery environment.

Unit Reference Number		J/504/6366
Qualification Framework		RQF
Title		Using manual metal arc welding equipment
Unit Level		Level 1
Guided Learning Hours		63
Unit Credit Value		10
Unit Grading Structure		Pass / Fail

Learning Outcome		Assessment Criteria - The learner can		Criteria expansion
1.	Using manual metal arc welding equipment	1.1	Work safely at all times, complying with health and safety legislation, regulations and other relevant guidelines	
		1.2	Prepare for the manual metal arc welding process, to include carrying out all of the following: <ul style="list-style-type: none"> • adhere to procedures or systems in place for risk assessment, COSHH, personal protective equipment (PPE) and other relevant safety regulations • check the condition and security of welding leads, earthing arrangements and electrode holder • set and adjust the welding conditions/parameters, in accordance with job instructions and the welding procedure specification (where appropriate) • prepare the work area for the welding activities (such as positioning welding screens and fume extraction) • prepare the materials and joint in readiness for welding (such as cleaning of joint faces, grinding weld preparations, setting up the joint, supporting the joint) 	
		1.3	Obtain and prepare the appropriate manual metal arc welding equipment and welding consumables	
		1.4	Use manual metal-arc welding and related equipment, to include either of the following: <ul style="list-style-type: none"> • alternating current (AC) equipment • direct current (DC) equipment 	
		1.5	Use one type of electrode from the following: <ul style="list-style-type: none"> • rutile • basic • cellulosic • other suitable electrodes 	

	1.6	Prepare and support the joint, using the appropriate methods	
	1.7	Tack weld the joint at appropriate intervals, and check the joint for accuracy before final welding	
	1.8	Weld the joint to the required quality, dimensions and profile specified	
	1.9	Produce two of the following welded joints of at least 100mm long, using single or multi-run welds (as appropriate), with at least one stop and start included: <ul style="list-style-type: none"> • fillet lap joints • Tee fillet joints • corner joints • butt joints 	
	1.10	Produce joints in one of the following types of material: <ul style="list-style-type: none"> • carbon steel • stainless steel 	
	1.11	Produce joints in one of the following forms of material: <ul style="list-style-type: none"> • plate • section • pipe/tube • other forms 	
	1.12	Weld joints, in good access situations, in one of the following BS EN ISO 6947 positions: <ul style="list-style-type: none"> • Flat (PA) • Horizontal vertical (PB) • Horizontal (PC) • Vertical upwards (PF) • Vertical downwards (PG) 	
	1.13	Check that the welded joint conforms to the specification, by checking all of the following: <ul style="list-style-type: none"> • dimensional accuracy • alignment/squareness • size and profile of weld • number of runs 	
	1.14	Produce welded joints which meet all of the following: (with reference to BS 4872 Part 1 Weld test requirements) <ul style="list-style-type: none"> • welds meet the required dimensional accuracy • fillet welds are equal in leg length and slightly convex in profile, with the size of the fillet equivalent to the thickness of the material welded • the welds are adequately fused, and there is minimal undercut, overlap and surface inclusions 	

			<ul style="list-style-type: none"> • joins at stop/start positions merge smoothly, with no pronounced hump or crater in the weld surface • tack welds are blended in to form part of the finished weld, without excessive hump • the weld surface is free from cracks and substantially free from porosity, shrinkage cavities and trapped slag • the weld surface and adjacent parent metal is substantially free from arcing or chipping marks 	
		1.15	Report any difficulties or problems that may arise with the welding activities, and carry out any agreed actions	
		1.16	Shut down the equipment to a safe condition on conclusion of the welding activities	
		1.17	Leave the work area in a safe and tidy condition on completion of the welding activities	
2.	Know how to <u>Use</u> manual metal arc welding equipment	2.1	State the safe working practices and procedures that need to be followed when using MMA welding equipment (such as general workshop safety; appropriate personal protective equipment; fire prevention; protecting other workers from the effects of the welding arc; safety in enclosed/confined spaces; fume extraction/control)	
		2.2	State the hazards associated with MMA welding (such as live electrical components; poor earthing; the electric arc; fumes and gases; spatter; hot slag and metal; grinding and mechanical metal/slag removal; elevated working; welding in enclosed spaces; slips, trips and falls), and how they can be minimised	
		2.3	State the personal protective equipment (PPE) to be worn for the welding activities (such as correctly fitting overalls; leather aprons, welding gloves/gauntlets; safety boots; head/eye shield with correct shade of filter)	
		2.4	State the major parts of the welding equipment, and their function (including AC and DC power sources and power ranges)	
		2.5	Describe types of electrodes used, and the correct control, storage and drying of electrodes	
		2.6	State the types of welded joint to be produced (such as lap joints, corner joints, tee joints, butt welds, single and multi-run welds)	
		2.7	Describe terminology used for the appropriate welding positions	
		2.8	Describe how to use and extract information from engineering drawings and related specifications (to include symbols and conventions to appropriate BS or ISO standards) in relation to work undertaken	
		2.9	Describe how to prepare the materials in readiness for the welding activity (such as ensuring that the material is free from excessive surface contamination (such as rust, scale, paint, oil/grease and moisture); ensuring that edges to be welded are correctly prepared (such as made flat, square or bevelled))	

	2.10	Describe how to set up and restrain the joint, and the tools and techniques that are used (such as the use of jigs and fixtures, restraining devices (such as clamps and weights/blocks); setting up the joint in the correct position and alignment)	
	2.11	Describe tack welding size and spacing in relationship to material thickness	
	2.12	State the techniques of operating the welding equipment to produce a range of joints in the various joint positions (such as striking and initiating the arc; fine adjustment of parameters; correct manipulation and welding speed of electrode; blending in stops/starts and tack welds)	
	2.13	Describe how to close down the welding equipment safely and correctly	
	2.14	Describe problems that can occur with the welding activities (such as causes of distortion and methods of control, effects of welding on materials and sources of weld defects), and how these can be overcome	
	2.15	Describe how to check the welded joints for uniformity, alignment, position and weld size and profile	
	2.16	Describe when to act on their own initiative and when to seek help and advice from others	
	2.17	State the importance of leaving the work area in a safe and clean condition on completion of welding activities (such as isolation of electrical supplies, safely storing equipment and consumables, removing and disposing of waste)	



Level 1 Unit – Using manual TIG welding equipment

Unit aim

This unit covers the skills and knowledge needed to prove the competences required for carrying out basic manual tungsten inert gas (TIG) welding that will prepare the learner for entry into the engineering or manufacturing sectors, creating a progression between education and employment, or that will provide a basis for the development of additional skills and occupational competences in the working environment.

The learner will be expected to prepare for the TIG welding activities by obtaining all the necessary job instructions, materials, tools, equipment and any documentation that may be required. The learner will also be expected to check the welding equipment and to ensure that all the leads/cables, hoses and torches are securely connected and free from damage.

In preparing to weld, the learner will need to set and adjust the welding conditions, in line with instructions and/or the welding procedure specification. The learner must operate the equipment safely and correctly and make any necessary adjustments to settings in line with their permitted authority, in order to produce the welded joints to the required specification.

The learner will need to be able to recognise basic welding defects, to take appropriate action to limit any faults that occur and to ensure that the finished workpiece is within the specification requirements. On completion of the welding activities, the learner will be expected to return the workholding devices to their designated location, and to leave the welding equipment and work area in a safe and tidy condition.

Unit introduction

The learner's responsibilities will require them to comply with health and safety requirements and organisational policy and procedures for the manual TIG welding activities undertaken. The learner will need to report any difficulties or problems that may arise, and to carry out any agreed actions. 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 an understanding of their work and will enable them to apply appropriate manual TIG welding techniques and procedures safely. The learner will understand the TIG welding process, and its application, and will know about the equipment, materials and consumables used, to the required depth to provide a sound basis for carrying out the activities to the required specification.

The learner will understand the safety precautions required when working with the manual TIG welding equipment, and with its associated tools and equipment. 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

To achieve this unit, the learner needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria determine the standard required to achieve the unit through a variety of assessment methods appropriate to the delivery environment.

Unit Reference Number		R/504/6368
Qualification Framework		RQF
Title		Using manual TIG welding equipment
Unit Level		Level 1
Guided Learning Hours		63
Unit Credit Value		10
Unit Grading Structure		Pass / Fail

Learning Outcome		Assessment Criteria - The learner can		Criteria expansion
1.	Using manual TIG welding equipment	1.1	Work safely at all times, complying with health and safety legislation, regulations and other relevant guidelines	
		1.2	Prepare for the manual TIG welding process, to include carrying out all of the following: <ul style="list-style-type: none"> • adhere to procedures or systems in place for risk assessment, COSHH, personal protective equipment (PPE) and other relevant safety regulations • check the condition and security of welding leads, earthing arrangements, hoses and welding torch • set and adjust the welding conditions/parameters, in accordance with job instructions and the welding procedure specification (where appropriate) • prepare the work area for the welding activities (such as positioning welding screens and fume extraction) • prepare the materials and joint in readiness for welding (such as cleaning of joint faces, grinding weld preparations, setting up the joint, supporting the joint) 	
		1.3	Obtain and prepare the appropriate welding equipment and welding consumables	
		1.4	Use welding equipment and consumables, appropriate to the material and application, to include one of the following: <ul style="list-style-type: none"> • AC current types • DC current types 	
		1.5	Prepare and support the joint, using the appropriate methods	
		1.6	Tack weld the joint at appropriate intervals, and check the joint for accuracy before final welding	
		1.7	Weld the joint to the required quality, dimensions and profile specified	
		1.8	Produce two of the following welded joints of at least 100mm long, using single or multi-run welds (as appropriate), with at least one stop and start included:	

		<ul style="list-style-type: none"> • fillet lap joints • Tee fillet joints • corner joints • butt joints • And using one of the following methods: • with filler wire • without filler wire (autogenously) 	
	1.9	Produce welded joints in one of the following types of material: <ul style="list-style-type: none"> • carbon steel • stainless steel • aluminium 	
	1.10	Produce joints in one of the following forms of material: <ul style="list-style-type: none"> • sheet (less than 3mm) • plate • section • pipe/tube • other forms 	
	1.11	Weld joints, in good access situations, in one of the following BS EN ISO 6947 positions: <ul style="list-style-type: none"> • Flat (PA) • Horizontal vertical (PB) • Horizontal (PC) • Vertical upwards (PF) • Vertical downwards (PG) 	
	1.12	Check that the welded joint conforms to the specification, by checking all of the following: <ul style="list-style-type: none"> • dimensional accuracy • alignment/squareness • size and profile of weld • number of runs 	
	1.13	Produce welded joints which meet all of the following: (with reference to BS 4872 Part 1 Weld test requirements) <ul style="list-style-type: none"> • welds meet the required dimensional accuracy • fillet welds are equal in leg length and slightly convex in profile, with the size of the fillet equivalent to the thickness of the material welded • the welds are adequately fused, and there is minimal undercut, overlap and surface inclusions • joins at stop/start positions merge smoothly, with no pronounced hump or crater in the weld surface 	

			<ul style="list-style-type: none"> tack welds are blended in to form part of the finished weld, without excessive hump the weld surface is free from cracks and substantially free from porosity, shrinkage cavities and trapped slag the weld surface and adjacent parent metal is substantially free from arcing or chipping marks 	
		1.14	Report any difficulties or problems that may arise with the welding activities, and carry out any agreed actions	
		1.15	Shut down the equipment to a safe condition on conclusion of the welding activities	
		1.16	Leave the work area in a safe and tidy condition on completion of the welding activities	
2.	Know how to use manual TIG welding equipment	2.1	State the safe working practices and procedures to be followed when using manual TIG welding equipment (such as general workshop safety; appropriate personal protective equipment (PPE); fire prevention; protecting other workers from the effects of the welding arc; safety in enclosed/confined spaces; fume extraction/control)	
		2.2	State the hazards associated with using manual TIG welding equipment (such as live electrical components; poor earthing; the electric arc; fumes and gases; hot metal; welding in enclosed spaces; slips, trips and falls), and how they can be minimised	
		2.3	State the personal protective equipment (PPE) to be worn for the welding activities (such as correctly fitting overalls; leather aprons, welding gloves/gauntlets; safety boots; head/eye shield with correct shade of filter)	
		2.4	State the correct handling and storage of gas cylinders (such as manual handling and use of cylinder trolley, leak detection procedures, relevant BCGA codes of practice, cylinder identification, gas pressures, cylinder and equipment safety features)	
		2.5	Describe how to use and extract information from engineering drawings and related specifications (to include symbols and conventions to appropriate BS or ISO standards) in relation to work undertaken	
		2.6	State the major parts of the welding equipment, and their function	
		2.7	Describe types and application of filler wires and welding electrodes	
		2.8	Describe reasons for using shielding gases, and the types and application of the various gases	
		2.9	Describe gas pressures and flow rates (in relation to the type of material being welded)	
		2.10	State the types of welded joint to be produced (such as lap joints, corner joints, tee joints and butt welds)	
		2.11	Describe terminology used for the appropriate welding positions	
		2.12	Describe how to prepare the materials in readiness for the welding activity (such as ensuring that the material is free from excessive surface contamination (such as rust, scale, paint, oil/grease and moisture); ensuring that edges to be welded are correctly prepared (such as made flat, square or bevelled)	

	2.13	Describe how to set up and restrain the joint, and the tools and techniques that are used (such as the use of jigs and fixtures, restraining devices (such as clamps and weights/blocks); setting up the joint in the correct position and alignment)	
	2.14	Describe tack welding size and spacing (in relation to material thickness)	
	2.15	State the techniques of operating the welding equipment to produce a range of joints in the various joint positions (such as fine adjustment of parameters; correct manipulation of the torch; blending in stops/starts and tack welds)	
	2.16	Describe how to close down the welding equipment safely and correctly	
	2.17	Describe problems that can occur with the welding activities (such as causes of distortion and methods of control, effects of welding on materials and sources of weld defects), and how these can be overcome	
	2.18	Describe how to check the welded joints for uniformity, alignment, position and weld size and profile	
	2.19	Describe when to act on their own initiative and when to seek help and advice from others	
	2.20	State the importance of leaving the work area in a safe and clean condition on completion of welding activities (such as isolation of electrical supplies, safely storing equipment and consumables, removing and disposing of waste)	



Level 1 Unit – Using semi-automatic MIG or MAG welding equipment

Unit aim

This unit covers the skills and knowledge needed to prove the competences required for a range of basic semi-automatic MIG, MAG or flux cored-wire arc welding equipment that will prepare the learner for entry into the engineering or manufacturing sectors, creating a progression between education and employment, or that will provide a basis for the development of additional skills and occupational competences in the working environment.

The learner will be expected to prepare for the welding activities by obtaining all the necessary job instructions, materials, tools, equipment and any documentation that may be required. The learner will also be expected to check the welding equipment and to ensure that all the leads/cables, shielding gas system, hoses and wire feed mechanisms are securely connected and free from damage.

In preparing to weld, the learner will need to set and adjust the welding conditions, in line with instructions and/or the welding procedure specification. The learner must operate the equipment safely and correctly and make any necessary adjustments to settings in line with their permitted authority, in order to produce the welded joints to the required specification.

The learner will need to be able to recognise basic welding defects, to take appropriate action to limit any faults that occur and to ensure that the finished workpiece is within the specification requirements. On completion of the welding activities, the learner will be expected to return the workholding devices to their designated location, and to leave the welding equipment and work area in a safe and tidy condition.

Unit introduction

The learner's responsibilities will require them to comply with health and safety requirements and organisational policy and procedures for the semi-automatic MIG/MAG welding activities undertaken. The learner will need to report any difficulties or problems that may arise, and to carry out any agreed actions. 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 an understanding of their work and will enable them to apply appropriate semi-automatic MIG/MAG welding techniques and procedures safely. The learner will understand the MIG/MAG welding process, and its application, and will know about the equipment, materials and consumables used, to the required depth to provide a sound basis for carrying out the activities to the required specification.

The learner will understand the safety precautions required when working with the semi-automatic MIG/MAG welding equipment, and with its associated tools and equipment. 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

To achieve this unit, the learner needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria determine the standard required to achieve the unit through a variety of assessment methods appropriate to the delivery environment.

Unit Reference Number		Y/504/6369
Qualification Framework		RQF
Title		Using semi-automatic MIG or MAG welding equipment
Unit Level		Level 1
Guided Learning Hours		63
Unit Credit Value		10
Unit Grading Structure		Pass / Fail

Learning Outcome		Assessment Criteria - The learner can		Criteria expansion
1.	Using semi-automatic MIG or MAG welding equipment	1.1	Work safely at all times, complying with health and safety legislation, regulations and other relevant guidelines	
		1.2	Prepare for the MIG, MAG or flux cored-wire welding process, to include carrying out all of the following: <ul style="list-style-type: none"> • adhere to procedures or systems in place for risk assessment, COSHH, personal protective equipment (PPE) and other relevant safety regulations • check the condition and security of welding leads/cables, hoses, shielding gas supply and wire feed mechanisms • set and adjust the welding conditions/parameters, in accordance with the welding procedure specification • prepare the work area for the welding activities (such as positioning welding screens and fume extraction) • prepare the materials and joint in readiness for welding (such as cleaning of joint faces, grinding weld preparations, setting up the joint, supporting the joint) 	
		1.3	Obtain and prepare the appropriate welding equipment and welding consumables	
		1.4	Use manual/semi-automatic welding and related equipment, to include one of the following: <ul style="list-style-type: none"> • MIG • MAG • other flux-cored wire welding equipment 	
		1.5	Use consumables appropriate to the material and application, to include the following: <ul style="list-style-type: none"> • One of the following wire types: <ul style="list-style-type: none"> • solid wire • cored wire • Plus one of the following types of shielding gas: 	

		<ul style="list-style-type: none"> • inert • active 	
	1.6	Prepare and support the joint, using the appropriate methods	
	1.7	Tack weld the joint at appropriate intervals, and check the joint for accuracy before final welding	
	1.8	Weld the joint to the required quality, dimensions and profile specified	
	1.9	Produce two of the following welded joints of at least 150mm long, by single or multi-run (as appropriate), with at least one stop and start included: <ul style="list-style-type: none"> • fillet lap joints • Tee fillet joints • corner joints • butt joints 	
	1.10	Produce joints in one of the following types of material: <ul style="list-style-type: none"> • carbon steel • stainless steel • aluminium 	
	1.11	Produce welded joints in one of the following forms of material: <ul style="list-style-type: none"> • plate • section • sheet (less than 3mm) • pipe/tube • other forms 	
	1.12	Weld joints in good access situations in one of the following BS EN ISO 6947 positions: <ul style="list-style-type: none"> • Flat (PA) • Horizontal vertical (PB) • Horizontal (PC) • Vertical upwards (PF) • Vertical downwards (PG) 	
	1.13	Check that the welded joint conforms to the specification, by checking all of the following: <ul style="list-style-type: none"> • dimensional accuracy • alignment/squareness • size and profile of weld • number of runs 	
	1.14	Produce welded joints which meet all of the following: (with reference to BS 4872 Part 1 Weld test requirements) <ul style="list-style-type: none"> • welds meet the required dimensional accuracy 	

			<ul style="list-style-type: none"> • fillet welds are equal in leg length and slightly convex in profile, with the size of the fillet equivalent to the thickness of the material welded • the welds are adequately fused, and there is minimal undercut, overlap and surface inclusions • joins at stop/start positions merge smoothly, with no pronounced hump or crater in the weld surface • tack welds are blended in to form part of the finished weld, without excessive hump • the weld surface is free from cracks and substantially free from porosity, shrinkage cavities and trapped slag • the weld surface and adjacent parent metal is substantially free from arcing or chipping marks 	
		1.15	Report any difficulties or problems that may arise with the welding activities, and carry out any agreed actions	
		1.16	Shut down the equipment to a safe condition on conclusion of the welding activities	
		1.17	Leave the work area in a safe and tidy condition on completion of the welding activities	
2.	Know how use semi-automatic MIG or MAG welding equipment	2.1	State the safe working practices and procedures to be followed when preparing and using MIG, MAG or flux cored wire arc welding equipment (such as general workshop safety; appropriate personal protective equipment (PPE); fire prevention; protecting other workers from the effects of the welding arc; safety in enclosed/confined spaces; fume extraction/control)	
		2.2	State the hazards associated with using MIG, MAG or flux cored-wire arc welding (such as live electrical components; poor earthing; the electric arc; fumes and gases; spatter; hot slag and metal; grinding and mechanical metal/slag removal; elevated working; enclosed spaces; slips, trips and falls), and how they can be minimised	
		2.3	State the personal protective equipment (PPE) to be worn for the welding activities (such as correctly fitting overalls; leather aprons, welding gloves/gauntlets; safety boots; head/eye shield with correct shade of filter)	
		2.4	State the correct handling and storage of gas cylinders (such as manual handling and use of cylinder trolley, leak detection procedures, relevant BCGA codes of practice, cylinder identification, gas pressures, cylinder and equipment safety features)	
		2.5	Describe how to use and extract information from engineering drawings and related specifications (to include symbols and conventions to appropriate BS or ISO standards) in relation to work undertaken	
		2.6	State the major parts of the welding equipment, and their function	
		2.7	Describe types, selection and application of electrode wires (such as solid and cored)	
		2.8	Describe reasons for using shielding gases, and the types and application of the various gases	

	2.9	Describe gas pressures and flow rates (in relation to the type of material being welded)	
	2.10	State the types of welded joints to be produced (such as lap joints, corner joints, tee joints and butt welds)	
	2.11	Describe terminology used for the appropriate welding positions	
	2.12	Describe how to prepare the materials in readiness for the welding activity (such as ensuring that the material is free from excessive surface contamination (such as rust, scale, paint, oil/grease and moisture); ensuring that edges to be welded are correctly prepared (such as made flat, square or bevelled)	
	2.13	Describe how to set up and restrain the joint, and the tools and techniques that are used (such as the use of jigs and fixtures, restraining devices (such as clamps and weights/blocks); setting up the joint in the correct position and alignment)	
	2.14	Describe tack welding size and spacing (in relation to material thickness)	
	2.15	State the techniques of operating the welding equipment to produce a range of joints in the various joint positions (such as fine adjustment of parameters; correct manipulation of the welding gun; blending in stops/starts and tack welds)	
	2.16	Describe methods/modes of metal transfer and their uses (such as dip, globular, free flight, spray and pulsed)	
	2.17	Describe how to close down the welding equipment safely and correctly	
	2.18	Describe problems that can occur with the welding activities (such as causes of distortion and methods of control; effects of welding on materials and sources of weld defects), and how these can be overcome	
	2.19	Describe how to check the welded joints for uniformity, alignment, position and weld size and profile	
	2.20	Describe when to act on their own initiative and when to seek help and advice from others	
	2.21	State the importance of leaving the work area in a safe and clean condition on completion of welding activities (such as isolation of electrical supplies, safely storing equipment and consumables, removing and disposing of waste)	



Level 1 Unit – Using manual oxy-fuel gas welding equipment

Unit aim

This unit covers the skills and knowledge needed to prove the competences required for a range of basic oxy-fuel gas manual welding equipment that will prepare the learner for entry into the engineering or manufacturing sectors, creating a progression between education and employment, or that will provide a basis for the development of additional skills and occupational competences in the working environment.

The learner will be expected to prepare for the oxy-fuel gas welding activities by obtaining all the necessary job instructions, materials, tools, equipment and any documentation that may be required. The learner will also be expected to check the welding equipment to ensure that the regulators, hoses, check valves, flashback arrestor and welding torch are securely connected and are free from leaks or damage.

In preparing to weld, the learner will need to set and adjust the gas pressures/welding conditions, in line with instructions and/or the welding procedure specification. The learner must operate the equipment safely and correctly and make any necessary adjustments to settings in line with your permitted authority, in order to produce the welded joints to the required specification. The learner will need to be able to recognise basic oxy-fuel gas welding defects, to take appropriate action to limit any faults that occur and to ensure that the finished workpiece is within the specification requirements. On completion of the welding activities, the learner will be expected to return all tools, equipment and workholding devices to their designated location, and to leave the welding equipment and work area in a safe and tidy condition.

Unit introduction

The learner's responsibilities will require them to comply with health and safety requirements and organisational policy and procedures for the oxy-fuel gas welding activities undertaken. The learner will need to report any difficulties or problems that may arise, and to carry out any agreed actions. 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 an understanding of their work and will enable them to apply appropriate manual oxy-fuel gas welding techniques and procedures safely. The learner will understand the oxy-fuel gas welding process, and its application, and will know about the equipment, materials and consumables used, to the required depth to provide a sound basis for carrying out the activities to the required specification.

The learner will understand the safety precautions required when working with the oxy-fuel gas welding equipment, and with its associated tools and equipment. 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

To achieve this unit, the learner needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria determine the standard required to achieve the unit through a variety of assessment methods appropriate to the delivery environment.

Unit Reference Number		R/504/6371
Qualification Framework		RQF
Title		Using manual oxy-fuel gas welding equipment
Unit Level		Level 1
Guided Learning Hours		63
Unit Credit Value		10
Unit Grading Structure		Pass / Fail

Learning Outcome		Assessment Criteria - The learner can		Criteria expansion
1.	Using manual oxy-fuel gas welding equipment	1.1	Work safely at all times, complying with health and safety legislation, regulations and other relevant guidelines	
		1.2	Prepare for the oxy-fuel gas welding process, to include carrying out all of the following: <ul style="list-style-type: none"> • adhere to procedures or systems in place for risk assessment, COSHH, personal protective equipment (PPE) and other relevant safety regulations • check that regulators, hoses and check valves are securely connected and free from leaks and damage • check/fit the correct gas nozzle to the torch • check that a flashback arrestor is fitted • set appropriate gas pressures • use the correct procedure for lighting, adjusting and extinguishing the welding flame • use appropriate and safe procedures for handling and storing of gas cylinders • prepare the work area for the welding activities (such as positioning welding screens and fume extraction) • prepare the materials and joint in readiness for welding (such as cleaning of joint faces, grinding weld preparations, setting up the joint, supporting the joint) 	
		1.3	Obtain and prepare the appropriate welding equipment and welding consumables	
		1.4	Prepare and support the joint, using the appropriate methods	
		1.5	Tack weld the joint at appropriate intervals, and check the joint for accuracy before final welding	
		1.6	Weld the joint to the required quality, dimensions and profile specified	
		1.7	Produce two of the following welded joints of at least 100mm long, by single or multi-run (as appropriate), with at least one stop and start included:	

			<ul style="list-style-type: none"> • fillet lap joints • tee fillet joints • corner joints • butt joints • welds made without filler wire (autogenously) • Using one of the following methods: • with filler wire • without filler wire (autogenously) 	
	1.8	Produce joints in one form of material from the following:	<ul style="list-style-type: none"> • sheet (less than 3mm) • plate • section • pipe/tube • other forms 	
	1.9	Weld joints, in good access situations, in one of the following BS EN ISO 6947 positions:	<ul style="list-style-type: none"> • flat (PA) • horizontal vertical (PB) • horizontal (PC) • vertical upwards (PF) • vertical downwards (PG) 	
	1.10	Check that the welded joint conforms to the specification, by checking all of the following:	<ul style="list-style-type: none"> • dimensional accuracy • alignment/squareness • size and profile of weld • number of runs 	
	1.11	Produce welded joints which meet all of the following: (with reference to BS 4872 Part 1 Weld test requirements)	<ul style="list-style-type: none"> • welds meet the required dimensional accuracy • fillet welds are equal in leg length and slightly convex in profile, with the size of the fillet equivalent to the thickness of the material welded • the welds are adequately fused, and there is minimal undercut, overlap and surface inclusions • joins at stop/start positions merge smoothly, with no pronounced hump or crater in the weld surface • tack welds are blended in to form part of the finished weld, without excessive hump 	

			<ul style="list-style-type: none"> the weld surface is free from cracks and substantially free from porosity, shrinkage cavities and trapped slag the weld surface and adjacent parent metal is substantially free from arcing or chipping marks 	
		1.12	Report any difficulties or problems that may arise with the welding activities, and carry out any agreed actions	
		1.13	Shut down the equipment to a safe condition on conclusion of the welding activities	
		1.14	Leave the work area in a safe and tidy condition on completion of the welding activities	
2.	Know how to use manual oxy-fuel gas welding equipment	2.1	State the safe working practices and procedures to be followed when preparing and using manual oxy-fuel gas welding equipment (such as general workshop safety; appropriate personal protective equipment (PPE); fire and explosion prevention, protecting other workers, safety in enclosed/confined spaces; fume extraction/control)	
		2.2	State the hazards associated with using manual oxy-fuel gas welding equipment (such as naked flames, fumes and gases, explosive gas mixtures, oxygen enrichment, spatter, hot metal, elevated working, welding in enclosed spaces, slips trips and falls), and how they can be minimised	
		2.3	State the personal protective equipment (PPE) to be worn for the welding activities (such as correctly fitting overalls; leather aprons, welding gloves/gauntlets; safety boots; head/eye shield with correct grade of filter)	
		2.4	State the correct handling and storage of gas cylinders (such as manual handling and use of cylinder trolley, leak detection procedures, relevant BCGA codes of practice, cylinder identification, gas pressures, cylinder and equipment safety features)	
		2.5	Describe how to use and extract information from engineering drawings and related specifications (to include symbols and conventions to appropriate BS or ISO standards) in relation to work undertaken	
		2.6	State the major parts of the welding equipment, and their function	
		2.7	State the consumables associated with gas welding (such as types of filler wire, fluxes, the types of gas and its supply and control)	
		2.8	Describe setting gas working pressures, reading the gauges to establish content and pressures	
		2.9	State the types of welded joints to be produced (such as lap joints, corner joints, tee joints and butt welds)	
		2.10	Describe terminology used for the appropriate welding positions	
		2.11	Describe how to prepare the materials in readiness for the welding activity (such as ensuring that the material is free from excessive surface contamination (such as rust, scale, paint, oil/grease and moisture); ensuring that edges to be welded are correctly prepared (such as made flat, square or bevelled)	

	2.12	Describe how to set up and restrain the joint, and the tools and techniques that are used (such as the use of jigs and fixtures, restraining devices (such as clamps and weights/blocks); setting up the joint in the correct position and alignment)	
	2.13	Describe tack welding size and spacing (in relation to material thickness)	
	2.14	State the techniques of operating the welding equipment to produce a range of joints in the various joint positions (such as selection of nozzle, lighting and adjusting the flame, correct manipulation of torch and filler rods)	
	2.15	State the safe and correct sequence for shutting down the equipment (such as sequence of turning off the gases, extinguishing the flame and closing valves on gas supply/cylinders)	
	2.16	Describe problems that can occur with the welding activities (such as causes of distortion and methods of control; effects of welding on materials and sources of weld defects), and how these can be overcome	
	2.17	Describe how to check the welded joints for uniformity, alignment, position and weld size and profile	
	2.18	Describe when to act on their own initiative and when to seek help and advice from others	
	2.19	State the importance of leaving the work area in a safe and clean condition on completion of welding activities (such as isolation of gas supplies, safely storing equipment and consumables, removing and disposing of waste)	

A large, stylized version of the 'eta' logo. The 'e' is gold, the 't' is black, and the 'a' is grey. The letters are thick and rounded, with a slight shadow effect.

Level 1 Unit – Wiring electrical equipment and circuits

Unit aim

This unit covers the skills and knowledge needed to prove the competences required to wire up electrical equipment and circuits. It will prepare the learner for entry into the engineering or manufacturing sectors, creating a progression between education and employment, or it will provide a basis for the development of additional skills and occupational competences in the working environment.

The learner will be expected to prepare for the electrical wiring activities by obtaining all the necessary job instructions, components, tools, equipment and any documentation that may be required. The learner will be required to use the appropriate tools and equipment, based on the operations to be performed and the components to be connected.

In carrying out the electrical wiring operations, the learner will be required to work to instructions for the wiring of the various electrical components and connectors that make up the electrical system/circuit being produced. The wiring activities will also include making all necessary checks and adjustments to the circuit, including visual checks for security of components, freedom from damage to components or cables, and simple continuity checks. On completion of the electrical wiring activities, the learner will be expected to return all tools and equipment to the correct location, and to leave the work area in a safe and tidy condition.

Unit introduction

The learner's responsibilities will require them to comply with health and safety requirements and organisational policy and procedures for the electrical wiring activities undertaken. The learner will need to report any difficulties or problems that may arise with the wiring activities, and to carry out any agreed actions. 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 an understanding of their work and will enable them to apply appropriate electrical wiring and termination techniques and procedures safely.

The learner will understand the electrical wiring process, and its application, and will know about the various cables and components used to produce the circuits, to the required depth to provide a sound basis for carrying out the activities to the required specification.

The learner will understand the safety precautions required when carrying out the wiring and testing activities, especially those for ensuring the safe isolation of the equipment and circuits produced. 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

To achieve this unit, the learner needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria determine the standard required to achieve the unit through a variety of assessment methods appropriate to the delivery environment.

Unit Reference Number		H/504/6374
Qualification Framework		RQF
Title		Wiring electrical equipment and circuits
Unit Level		Level 1
Guided Learning Hours		63
Unit Credit Value		10
Unit Grading Structure		Pass / Fail

Learning Outcome		Assessment Criteria - The learner can		Criteria expansion
1.	Wiring electrical equipment and circuits	1.1	Work safely at all times, complying with health and safety legislation, regulations and other relevant guidelines	
		1.2	Carry out all of the following during the wiring and testing activities: <ul style="list-style-type: none"> • adhere to procedures or systems in place for risk assessment, COSHH, personal protective equipment (PPE) and other relevant safety regulations • ensure the safe isolation of services during the wiring and testing activities • follow job instructions, circuit drawings and test procedures at all times • check that tools and test instruments to be used are in a safe, tested, calibrated and usable condition • ensure that the electrical system is kept free from foreign objects, dirt or other contamination • where appropriate, apply procedures and precautions to eliminate electrostatic discharge (ESD) hazards • return all tools and equipment to the correct location on completion of the wiring and testing activities 	
		1.3	Obtain the correct tools and equipment for the wiring and testing operations, and check that they are in a safe and usable condition	
		1.4	Mount and secure the electrical components safely and correctly to meet specification requirements	
		1.5	Install and terminate the cables to the appropriate connections on the components	
		1.6	Produce circuits using one of the following types of cable: <ul style="list-style-type: none"> • single core • multicore • PVC twin and earth 	

		<ul style="list-style-type: none"> • flexible (such as cotton or rubber covered) • data/communication • fibre-optics • screened/coaxial • ribbon cables • wiring loom/harness 	
	1.7	<p>Wire up one of the following types of electrical circuit:</p> <ul style="list-style-type: none"> • domestic lighting circuits • domestic power circuits • motor start and control • vehicle heating or ventilating • vehicle lighting • vehicle starting and ignition • instrumentation and control circuits • alarm systems (such as fire, intruder, process control) • electro-pneumatic or electro-hydraulic control circuits • other control circuits (such as pumps, fans, blowers, extractors)lighting • air conditioning control circuits • refrigeration control circuits • heating/boiler control circuits • aircraft lighting circuits • power generation and control circuits • avionic circuits and systems • emergency lighting systems • communication systems • computer systems • other specific electrical circuits 	
	1.8	<p>Wire up and terminate four of the following electrical modules/components to produce the circuits:</p> <ul style="list-style-type: none"> • isolators • switches • sockets • relays/contactors • alarm devices • motors and starters • pumps • heaters 	

		<ul style="list-style-type: none"> • blowers • lamp holders • panel lamps • luminaires • ballast chokes • consumer units • residual current device (RCD) • instruments • transformers • panels or sub-assemblies • fuses/circuit breakers • sensors • actuators • junction boxes/terminal blocks • other electrical components 	
	1.9	<p>Carry out all of the following wiring and termination activities:</p> <ul style="list-style-type: none"> • positioning and securing of equipment and components • determining the current rating and lengths of cables required • stripping outer coating without damage to conductor insulation • stripping cable conductor insulation/protection • making mechanical/screwed/clamped connections • crimping (such as spade end, loops, tags and pins) • soldering and de-soldering • secure wires and cables (such as glands, clamps, clips, plastic strapping, lacing, harnessing) 	
	1.10	<p>Check the completed circuit to ensure that all operations have been completed, and that the finished circuit meets the required specification</p>	
	1.11	<p>Carry out checks to the equipment and circuits being wired, to include all of the following:</p> <ul style="list-style-type: none"> • making visual checks (such as completeness, signs of damage, incorrect termination) • movement checks (such as loose fittings and connections) • continuity 	
	1.12	<p>Produce electrical circuits, in compliance with one or more of the following standards:</p> <ul style="list-style-type: none"> • BS 7671/IET wiring regulations • other BS and/or ISO standards • company standards and procedures 	

		1.13	Report any difficulties or problems that may arise with the electrical wiring activities, and carry out any agreed actions	
		1.14	Leave the work area in a safe and tidy condition on completion of the electrical wiring activities	
2.	Know how to wire electrical equipment and circuits	2.1	State the specific safety practices and procedures that the learner needs to observe when wiring electrical equipment (including any specific legislation, regulations or codes of practice for the activities, equipment or materials)	
		2.2	State the hazards associated with wiring electrical equipment, and with the tools and equipment used, (such as using sharp instruments for stripping cable insulation, using soldering irons), and how they can be minimised	
		2.3	State the importance of wearing appropriate protective clothing and equipment (PPE), and keeping the work area safe and tidy	
		2.4	Describe what constitutes a hazardous voltage and how to recognise victims of electric shock	
		2.5	Describe how to reduce the risks of a phase to earth shock (such as insulated tools, rubber matting and isolating transformers)	
		2.6	State the interpretation of circuit diagrams, wiring diagrams, and other relevant specifications (including BS and ISO schematics, wiring regulations, symbols and terminology)	
		2.7	State the types of cabling used for wiring up the equipment/circuits (such as multicore cables, single core cables, solid and multi-stranded cables, screened cables)	
		2.8	State the application and use of a range of electrical components (such as switches, sockets, lighting and fittings, junction boxes, consumer units, relays, solenoids, transformers, sensors and actuators, circuit protection equipment)	
		2.9	Describe how to check that components meet the required specification/operating conditions (such as values, tolerance, current carrying capacity, voltage rating, power rating, working temperature range)	
		2.10	Describe methods of mounting and securing electrical equipment/components to various surfaces (such as the use of nuts and bolts, screws and masonry fixing devices)	
		2.11	State the specific electrical termination methods and devices to be used (such as plugs and sockets, soldering, screwed, clamped and crimped connections)	
		2.12	State the use of BS7671/IET wiring regulations when selecting wires and cables	
		2.13	Describe how to prepare the cables for terminating (such as cutting them to the correct length, removing correct length of outer and inner insulation without damaging insulation or conductors)	
		2.14	Describe methods of attaching markers/labels to components or cables to assist with identification (such as colour coding conductors, using coded tabs)	

	2.15	State the tools and equipment used in the wiring and testing activities (including the use of cable stripping tools, crimping tools, soldering irons)	
	2.16	State the importance of conducting inspections and checks on the completed circuit (such as visual examination for loose or exposed conductors, excessive solder or solder spikes which may allow short circuits to occur, strain on terminations, insufficient slack cable at terminations, continuity checks)	
	2.17	State the importance of earthing procedures for electrical installations, and why the earth bonding must be both mechanically and electrically secure	
	2.18	Describe problems that can occur with the wiring operations, and how these can be overcome	
	2.19	Describe when to act on their own initiative and when to seek help and advice from others	
	2.20	State the importance of leaving the work area in a safe and clean condition on completion of the wiring (such as returning hand tools and test equipment to the designated location, cleaning the work area, and removing and disposing of waste)	



Level 1 Unit – Assembling electrical wiring support systems

Unit aim

This unit covers the skills and knowledge needed to prove the competences required to form and assemble electrical wiring support systems such as conduit, trunking and traywork systems. It will prepare the learner for entry into the engineering or manufacturing sectors, creating a progression between education and employment, or it will provide a basis for the development of additional skills and occupational competences in the working environment.

The learner will be expected to prepare for the assembly of the electrical wiring support systems by obtaining all the necessary job instructions, components, tools, equipment and any documentation that may be required.

The assembly activities will include the forming and assembly of metallic and/or non-metallic systems, and will cover the selection of the appropriate materials, cutting and bending/forming the appropriate pieces that make up the support system. The learner will also need to assemble the prepared pieces, using a range of connection devices, and to position, align and secure them in the correct locations, using the specified/appropriate techniques. On completion of the assembly activities, the learner will be expected to return all tools and equipment to the correct location, and to leave the work area in a safe and tidy condition.

Unit introduction

The learner's responsibilities will require them to comply with health and safety requirements and organisational policy and procedures for the assembly of the electrical wiring support systems. The learner will need to report any difficulties or problems that may arise with the assembly activities, and to carry out any agreed actions. 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 an understanding of their work and will enable them to apply appropriate assembly techniques and procedures safely for electrical wiring support systems.

The learner will understand the forming and assembly methods and procedures used, and their application, and will know about the various wiring support systems and components used to produce the assemblies, to the required depth to provide a sound basis for carrying out the activities to the required specification.

The learner will understand the safety precautions required when carrying out the assembly activities, especially those for handling long lengths of conduit or trunking. 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

To achieve this unit, the learner needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria determine the standard required to achieve the unit through a variety of assessment methods appropriate to the delivery environment.

Unit Reference Number		M/504/6376
Qualification Framework		RQF
Title		Assembling electrical wiring support systems
Unit Level		Level 1
Guided Learning Hours		63
Unit Credit Value		10
Unit Grading Structure		Pass / Fail

Learning Outcome		Assessment Criteria - The learner can		Criteria expansion
1.	Assembling electrical wiring support systems	1.1	Work safely at all times, complying with health and safety legislation, regulations and other relevant guidelines	
		1.2	Carry out all of the following during the electrical wiring support system forming and assembly activities: <ul style="list-style-type: none"> • adhere to procedures or systems in place for risk assessment, COSHH, personal protective equipment (PPE) and other relevant safety regulations • follow job instructions and assembly/installation drawings at all times • ensure that the electrical cable enclosure system is kept free from foreign objects, dirt or other contamination • apply safe and appropriate forming and assembly techniques and procedures at all times • return all tools and equipment to the correct location on completion of the assembly/installation activities 	
		1.3	Obtain the correct tools and equipment for the cutting, forming and assembly operations, and check that they are in a safe and usable condition	
		1.4	Cut and form the electrical wiring support system components to the required size and shape, using appropriate tools and techniques	
		1.5	<ul style="list-style-type: none"> • Form and assemble one of the following types of electrical wiring support systems: • metal conduit systems • non-metallic conduit systems • non-metallic trunking systems • metal trunking system • traywork systems 	

	1.6	Assemble the electrical wiring support system, using the appropriate connectors	
	1.7	<p>Include three of the following in the electrical cable support systems:</p> <ul style="list-style-type: none"> • straight connectors/couplings • bends/elbows (solid or inspection type) • tee pieces (such as solid or inspection type) • boxes (such as circular or square, terminal or multi branch) • reducers • conversion units and adaptors • crossover units (such as saddle sets) • inside and outside risers 	
	1.8	<p>Include four of the following in the electrical wiring support systems:</p> <ul style="list-style-type: none"> • horizontal runs • bends • tee junctions • vertical drops • offsets • bridge/saddle sets 	
	1.9	Mount and secure the electrical wiring support system components safely and correctly to meet the specification requirements	
	1.10	<p>Construct electrical wiring support system components, to include carrying out four of the following:</p> <ul style="list-style-type: none"> • cutting the materials to the correct lengths (taking into account allowances for bends or joints required) • removing all burrs and sharp edges • producing external threads on conduit • producing or fabricating bends • producing or fabricating offsets • producing or fabricating bridge/saddle sets 	
	1.11	Check the completed assembly to ensure that all operations have been completed, and that the finished assembly is secure and meets the required specification	
	1.12	<p>In checking the completed assembly, include carrying out all of the following:</p> <ul style="list-style-type: none"> • checking for level and alignment • checking that all connections are secure • ensuring that sufficient supports are used and that they are correctly spaced • correct outlets are used (such as for sockets, switches, light fittings, wire junction and inspection fittings) 	

		1.13	Produce electrical wiring support systems, in compliance with one or more of the following standards: <ul style="list-style-type: none"> • BS 7671/IET wiring regulations • Other BS and/or ISO standards • company standards and procedures 	
		1.14	Report any difficulties or problems that may arise with the electrical wiring support system assembly activities, and carry out any agreed actions	
		1.15	Leave the work area in a safe and tidy condition on completion of the assembly of the electrical wiring support systems	
2.	Know how to assemble electrical wiring support systems	2.1	State the specific safety practices and procedures that they will need to observe when forming and assembling electrical wiring and support systems (including any specific legislation, regulations or codes of practice for the activities, equipment or materials)	
		2.2	State the hazards associated with forming and assembling electrical wiring and support system components, and with the tools and equipment used (such as using bending and forming equipment, handling long lengths of pipe and trunking, using solvents and adhesives), and how they can be minimised	
		2.3	State the importance of wearing appropriate protective clothing and equipment (PPE), and keeping the work area safe and tidy	
		2.4	State the interpretation of circuit diagrams, wiring diagrams, and other relevant specifications (including BS and ISO schematics, wiring regulations, symbols and terminology)	
		2.5	State the various types of electrical wiring support system used, and their typical applications	
		2.6	Describe marking out lengths to be cut, taking into account any allowances (such as for bending, screwing, cementing)	
		2.7	Describe methods of holding workpieces without damaging them (such as use of pipe vice)	
		2.8	State the tools and equipment used in the cutting, bending and forming operations (such as the use of conduit bending machines, threading equipment, hot air torches and bending springs)	
		2.9	Describe methods of producing bends and sets in conduit materials (such as 90-degree bends, offsets, bridge sets)	
		2.10	Describe methods of bending plastic conduit (such as using hot air guns and springs)	
		2.11	Describe how to produce fabricated bends in trunking and traywork section material (such as bends, Tee junctions, double and saddle sets)	
		2.12	State the methods of forming screw threads on ends of conduit, and using appropriate tools to remove all sharp edges and burrs	

	2.13	State the various fittings used to assemble conduit, trunking and traywork systems (including screwed fittings, cemented fittings, straight connectors, bends, Tees, inspection fittings, light, power and control outlet boxes)	
	2.14	State the importance and use of inspection fittings (such as elbows and junction boxes)	
	2.15	State the problems to look for when checking finished components/assemblies (such as dimensional checks, position and angle of bends/sets, out of alignment, loose connections, insufficient supports, damaged threads, deformed pipe around area of bend, burrs and sharp edges that could damage cables)	
	2.16	Describe how to check alignment of components (including use of plumb bobs, levels and by visual means)	
	2.17	State the methods of supporting and securing the components (such as position and spacing of supporting brackets and devices, using pipe clips, saddles and supports)	
	2.18	Describe problems that can occur with the assembly operations, and how these can be overcome	
	2.19	Describe when to act on their own initiative and when to seek help and advice from others	
	2.20	State the importance of leaving the work area in a safe and clean condition on completion of the assembly activities (such as returning tools and equipment to the designated location, cleaning the work area, and removing and disposing of waste)	

A large, stylized outline of the word 'eta' in a rounded, lowercase font. The 'e' is gold, the 't' is black, and the 'a' is grey, matching the logo in the top right corner.

Level 1 Unit – Assembling electronic circuits

Unit aim

This unit covers the skills and knowledge needed to prove the competences required to assemble electronic components to produce circuits. It will prepare the learner for entry into the engineering or manufacturing sectors, creating a progression between education and employment, or it will provide a basis for the development of additional skills and occupational competences in the working environment.

The learner will be expected to prepare for the assembly of the electronic components by obtaining all the necessary job instructions, components, tools, equipment and any documentation that may be required.

The activities will include the assembly of a range of electronic components, such as resistors (fixed and variable), capacitors (fixed and variable), diodes, transistors and other semiconductor devices, integrated circuits (analogue and digital), miniature transformers, switches, indicators, wire links and a range of connectors, spacers and brackets, to form various types of circuits. This will involve using a range of tools and equipment, along with soldering techniques and anti-static protection techniques. On completion of the electronic component assembly activities, the learner will be expected to return all tools and equipment to the correct location, and to leave the work area in a safe and tidy condition.

Unit introduction

The learner's responsibilities will require them to comply with health and safety requirements and organisational policy and procedures for the electronic assembly activities. The learner will need to report any difficulties or problems that may arise with the assembly activities, and to carry out any agreed actions. 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 an understanding of their work and will enable them to apply appropriate assembly techniques and procedures safely for electronic components and circuits.

The learner will understand the assembly methods and procedures used, and their application, and will know about the various components used to produce the circuits, to the required depth to provide a sound basis for carrying out the activities to the required specification.

The learner will understand the safety precautions required when carrying out the electronic component assembly activities, and with using the associated tools and equipment. 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

To achieve this unit, the learner needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria determine the standard required to achieve the unit through a variety of assessment methods appropriate to the delivery environment.

Unit Reference Number		T/504/6380
Qualification Framework		RQF
Title		Assembling electronic circuits
Unit Level		Level 1
Guided Learning Hours		63
Unit Credit Value		10
Unit Grading Structure		Pass / Fail

Learning Outcome		Assessment Criteria - The learner can		Criteria expansion
1.	Assembling electronic circuits	1.1	Work safely at all times, complying with health and safety legislation, regulations and other relevant guidelines	
		1.2	Carry out all of the following during the electronic assembly activities: <ul style="list-style-type: none"> • adhere to procedures or systems in place for risk assessment, COSHH, personal protective equipment (PPE) and other relevant safety regulations • follow job instructions, assembly drawings and assembly procedures at all times • ensure that the components are free from damage, dirt or other contamination • prepare the electronic components for the assembly operations (such as pre-forming and cleaning pins) • use safe and approved techniques to mount the electronic components on the circuit boards • check that tools and equipment to be used are in a safe, tested and usable condition • where appropriate, apply procedures and precautions to eliminate electrostatic discharge (ESD) hazards (such as the use of grounded wrist straps and mats) • follow clean work area protocols, where appropriate • return all tools and equipment to the correct location on completion of the assembly activities 	
		1.3	Obtain the correct tools and equipment for the assembly operations, and check that they are in a safe and usable condition	
		1.4	Assemble circuits, using four of the following tools: <ul style="list-style-type: none"> • heat shunts/tweezers • snipe or long nosed pliers • sleeving pliers 	

		<ul style="list-style-type: none"> • component forming devices • wire strippers • side or end cutters • mechanical fasteners (screwdriver, spanners) • anti-static packaging, mats and straps • specialised assembly tools/equipment 	
	1.5	Use the appropriate methods and techniques to assemble the electronic components in their correct positions	
	1.6	Assemble one of the following circuit types: <ul style="list-style-type: none"> • single-sided circuit • flexible circuit • thick film circuit • double-sided circuit • thin film circuit • hybrid circuit 	
	1.7	Assemble electronic components, using one of the following: <ul style="list-style-type: none"> • manual soldering techniques • surface mount techniques • mechanical fixing methods 	
	1.8	Assemble circuits to the required specification, to include using ten of the following types of component: <ul style="list-style-type: none"> • fixed resistors • variable resistors • potentiometers • light dependent resistors (LDR) • fixed capacitors • variable capacitors • electrolytic capacitors • diodes • Zener diodes • light emitting diodes • transistors • thyristors • thermistors • analogue or digital integrated circuits • surface mount packages • rectifiers 	

			<ul style="list-style-type: none"> • switches • mini transformers • decoders • regulators • encoders or resolvers • inverters or servo controllers • edge connectors • wiring pins/tags/wire links • fixing spacers • insulators • small heat sinks • cables • cable connectors • protection devices • opto-electronics/optical fibre components • relays • inductors • other specific electronic components 	
		1.9	<p>Assemble electronic components to produce two of the following types of circuit:</p> <ul style="list-style-type: none"> • audio amplifiers • signal converters • signal generators • counter/timers • oscillators • filters • microprocessor based applications (such as PIC chips) • comparators • power amplifiers • motor control • regulated power supplies • logic function controls • display circuits • ADC and DAC hybrid circuits • sensor/actuator circuit (such as linear, rotational, temperature, photo-optic, flow, level, pressure) • digital circuit (such as process control, microprocessor, logic devices, display devices) 	

			<ul style="list-style-type: none"> • signal processing circuit (such as frequency modulating/demodulating, amplifiers, filters) • alarms and protection circuits • other specific circuit 	
		1.10	Secure the components, using the specified connectors, securing devices and soldering techniques	
		1.11	Wire and terminate cables to the appropriate connections on the circuit boards	
		1.12	Check the completed assembly to ensure that all operations have been completed, and that the finished assembly meets the required specification	
		1.13	Carry out visual checks on the completed circuits, to include all of the following: <ul style="list-style-type: none"> • soldered joints are clean, shiny, free from solder spikes, bridges, holes, excess solder and flux • components are correctly mounted for best physical support, and are correctly orientated • excess component leads have been trimmed off safely to the standard required • circuit tracks are free from faults (such as lifting, breaks, bridges, hot spots) • there are no obvious signs of damage to components or to the substrate • all required connectors, wire links, spacers and other ancillary items are in place 	
		1.14	Produce electronic circuits in compliance with one of the following: <ul style="list-style-type: none"> • BS or ISO standards and procedures • customer standards and requirements • company standards and procedures • other international standards 	
		1.15	Report any difficulties or problems that may arise with the electronic assembly and wiring activities, and carry out any agreed actions	
		1.16	Leave the work area in a safe and tidy condition on completion of the assembly activities	
2.	Know how to assemble electronic circuits	2.1	State the specific safety practices and procedures that the learner needs to observe when assembling electronic circuits (including any specific legislation, regulations or codes of practice for the activities, equipment or materials)	
		2.2	State the hazards associated with assembling electronic circuits (such as heat from soldering irons, toxic fumes, static electricity, using sharp instruments for stripping cable insulation), and how they can be minimised	
		2.3	State the importance of wearing appropriate protective clothing and equipment (PPE), and keeping the work area safe and tidy	
		2.4	State the precautions to be taken to prevent electrostatic discharge (ESD) damage to electronic circuits and components (such as use of earthed wrist straps, anti-static mats, special packaging and handling areas)	

	2.5	Describe what constitutes a hazardous voltage and how to recognise victims of electric shock	
	2.6	Describe how to reduce the risks of a phase to earth shock (such as insulated tools, rubber matting and isolating transformers)	
	2.7	Describe how to use and extract information from circuit diagrams, block and schematic diagrams, equipment manuals, data sheets and instructions (to include symbols and conventions to appropriate BS or ISO standards) in relation to work undertaken	
	2.8	State the various types of circuit boards used (such as printed circuit boards, thin film, thick film and flexible film circuitry)	
	2.9	State how to recognise, read the values and identify polarity and any other orientation requirements for the electronic components being used in the assemblies (such as capacitors, diodes, transistors, integrated circuit chips, and other discrete through-hole or surface-mounted components)	
	2.10	State the preparation requirements for components to be used in the assembly (such as pre-forming and cleaning component pins/legs)	
	2.11	Describe methods of mounting and securing electronic components to various surfaces (such as the use of manual soldering techniques, surface mount technologies and mechanical fixing devices, use of heat sinks/shunts)	
	2.12	Describe methods of attaching markers/labels to components or cables to assist with identification (such as colour coding conductors, using coded tabs)	
	2.13	State the use of specifications, and other, regulations when selecting wires and cables	
	2.14	State the importance of making visual checks of the completed assembly (such as visual examination for excessive solder or solder spikes which may allow short circuits to occur, correct orientation of components for pin configuration or polarity, obvious signs of damage (such as heat damage) or strain on terminations)	
	2.15	Describe how to remove and replace faulty components without causing damage to circuit boards or surrounding components	
	2.16	State the tools and equipment used in the electronic assembly activities (including the use of cable stripping tools, crimping tools, soldering irons, specialist assembly tools)	
	2.17	State the importance of ensuring that all tools are in a safe and serviceable condition, are used correctly and are returned to their correct location on completion of the assembly activities	
	2.18	Describe when to act on their own initiative and when to seek help and advice from others	
	2.19	State the importance of leaving the work area in a safe and clean condition on completion of the electronic assembly activities (such as returning tools and equipment to the designated location, cleaning the work area, removing and disposing of waste)	



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Level 1 Unit – Carrying out composite moulding activities

Unit aim

This unit covers the skills and knowledge needed to prove the competences required to produce composite mouldings, using techniques such as wet lay-up, pre-preg resin infusion techniques, spray lay up hot press, resin and pultrusion. It will prepare the learner for entry into the engineering or manufacturing sectors, creating a progression between education and employment, or it will provide a basis for the development of additional skills and occupational competences in the working environment.

The learner will be expected to prepare for the composite moulding activities by obtaining all the necessary job instructions, materials, tools, equipment and any documentation that may be required.

The learner will be expected to obtain and check the tooling, apply release agents and prepare the composite materials. The learner will produce the composite mouldings, which will incorporate a range of features, using a range of application methods. The activities will also include making all necessary checks, to ensure that the mouldings meet the required specification and have an appropriate cosmetic appearance. On completion of the composite moulding activities, the learner will be expected to return all tools and equipment to the correct location, and to leave the work area in a safe and tidy condition.

Unit introduction

The learner's responsibilities will require them to comply with health and safety requirements and organisational policy and procedures for the composite moulding activities undertaken. The learner will need to report any difficulties or problems that may arise with the moulding activities and carry out any agreed actions. 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 an understanding of their work and will enable them to apply appropriate composite moulding techniques and procedures safely. The learner will understand the moulding/laying-up procedure, and its application, and will know about the equipment, materials and consumables, to the required depth to provide a sound basis for carrying out the activities to the required specification.

The learner will understand the safety precautions required when carrying out the composite moulding activities, and when using the associated tools and equipment. 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

To achieve this unit, the learner needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria determine the standard required to achieve the unit through a variety of assessment methods appropriate to the delivery environment.

Unit Reference Number		Y/504/6386
Qualification Framework		RQF
Title		Carrying out composite moulding activities
Unit Level		Level 1
Guided Learning Hours		63
Unit Credit Value		10
Unit Grading Structure		Pass / Fail

Learning Outcome		Assessment Criteria - The learner can		Criteria expansion
1.	Carrying out composite moulding activities	1.1	Work safely at all times, complying with health and safety legislation, regulations and other relevant guidelines	
		1.2	Carry out all of the following during the composite moulding activities: <ul style="list-style-type: none"> • adhere to procedures or systems in place for risk assessment, COSHH, personal protective equipment (PPE) and other relevant safety regulations • follow job instructions, drawings, process specifications and moulding/lay-up procedures • ensure that all equipment and tools used are in a safe and serviceable condition • return all tools and equipment to the correct location on completion of the moulding/lay-up activities 	
		1.3	Prepare the moulds, jigs or formers ready for the manufacturing operations	
		1.4	Prepare for the composite moulding activities, to include carrying out all of the following as applicable to the moulding process: <ul style="list-style-type: none"> • Ensure the correct tooling is being used and check for resin build up and surface defects • correctly apply sealers/release agents • Ensure the correct materials are being used for the activity, and check that they are 'in life' • cut the materials to the correct size and shape (where applicable) • obtain the correct measure and mix of resin/catalyst • check equipment settings are correct • dispense and apply the correct measure and mix of resin/catalyst 	
		1.5	Carry out the moulding or laying-up activities, using the correct methods and techniques	

	1.6	<p>Carry out one of the following composite moulding activities:</p> <ul style="list-style-type: none"> • wet lay-up • pre-preg laminating • resin infusion (flow or film) • spray lay-up laminating • hot press moulding • resin transfer moulding • pultrusion techniques • other (to be specified) 	
	1.7	<p>Produce composite mouldings which combine operations and include three of the following shape features:</p> <ul style="list-style-type: none"> • internal corner • external corner • vertical surface • return surfaces • double curvature • concave surface • flanges • convex surface • joggle details • nett edges 	
	1.8	<p>Produce composite mouldings using three of the following:</p> <ul style="list-style-type: none"> • resin (such as polyester, epoxy, phenolic, vinyl ester, bismaleimide, cyanate ester) • fibre (such as glass, carbon, polyethylene, aramid, hybrid) • reinforcement (such as braids, roving, tapes, chopped strand, continuous filament, woven) • core material (such as wood, core mat, structural foam, honeycomb) 	
	1.9	<p>Use one of the following during the cure cycle: (where it is appropriate to the moulding technique used)</p> <ul style="list-style-type: none"> • oven • heated tools/moulds • autoclave • heated press • pressure bags • vacuum bags • thermal mould expansion • fibre tensioning 	

		<ul style="list-style-type: none"> • curing lamps • infrared heating • microwave • hot bonder • electric heating • water/steam heating 	
	1.10	<p>Use one of the following to apply pressure during the moulding process</p> <ul style="list-style-type: none"> • pressure bags • vacuum bags • hot de-bulk • pressure de-bulk • press • autoclave • thermal mould expansion • fibre tensioning 	
	1.11	Trim/finish moulding to specification (where applicable)	
	1.12	<p>Remove the composite mouldings from the formers, and carry out three of the following as applicable to the moulding process:</p> <ul style="list-style-type: none"> • visually check that the moulding is complete and free from defects • mark out the mouldings for trimming of excess material • cut/trim the mouldings, using appropriate tools and equipment (such as cutting wheels/discs, routers, saws) • carry out edge filling (where appropriate) • sand the mouldings, using appropriate tools and equipment (such as rubbing blocks, diamond files, disc or belt sanders, pencil grinders) • produce and finish holes in the mouldings, using appropriate tools and techniques (such as drills, hole saws, countersinks, counterbores, threading devices), where appropriate • polish the mouldings using appropriate tools and equipment (such as wet sanding, cutting compounds) • store components in the correct orientation and location 	
	1.13	Check that all the required operations have been completed to specification	
	1.14	<p>Produce composite mouldings which comply with all of the following:</p> <ul style="list-style-type: none"> • components are dimensionally accurate within specification requirements 	

			<ul style="list-style-type: none"> finished components meet the required shape/geometry (such as squareness, straightness, angularity and being free from twists) completed components are free from defects, sharp edges or slivers components meet company standards and procedures 	
		1.15	Report any difficulties or problems that may arise with the moulding activities, and carry out any agreed actions	
		1.16	Leave the work area in a safe and tidy condition on completion of the moulding activities	
2.	Know how to carry out composite moulding activities	2.1	State the health and safety precautions to be taken, and procedures to be used, when working with composite materials, tools and equipment	
		2.2	State the hazards associated with using composite materials, consumables, tools and equipment, and how to minimise these in the work area	
		2.3	State the protective equipment (PPE) that is needed for personal protection and, where required, the protection of others	
		2.4	State the specific workshop environmental conditions that must be observed when producing composite mouldings (such as temperature, humidity, styrene levels to threshold limits, fume/dust extraction systems and equipment)	
		2.5	Describe how to use and extract information from engineering drawings and related specifications (to include symbols and conventions to appropriate British, European or relevant International standards in relation to work undertaken)	
		2.6	State the types of resin systems, fibres and reinforcement used, and their applications	
		2.7	State the visual identification of both raw and finished composite materials	
		2.8	Describe methods of preparation for patterns, moulds and tooling (including the correct use of surface sealers and release agents)	
		2.9	Describe methods used in the application of materials to tooling surfaces (such as for tailoring and cutting materials)	
		2.10	Describe mixing ratios for gel coats, resins and catalysts, and their associated working times	
		2.11	State the methods used in the application of the resin/fibre during the moulding activity	
		2.12	State the curing of mouldings, and the importance of adhering to the cure cycle	
		2.13	State the tools and equipment used in the moulding activities, and their care, preparation and control procedures	
		2.14	Describe how to recognise faults that can occur during the moulding process	
		2.15	Describe procedures and methods used for removing mouldings from production tooling	
		2.16	State the identification of defects in the composite moulding (such as de-lamination, voids, contaminants)	
		2.17	Describe how to mark out the mouldings in preparation for the trimming activities, and the tools and equipment to be used	

	2.18	State the methods and techniques used to trim mouldings, and the different types of manual and power tools used in the trimming operations	
	2.19	State the care and safe handling of production tooling and composite mouldings throughout the production cycle	
	2.20	Describe why it is important to keep the tools and equipment clean and free from damage, to practice good housekeeping of tools and equipment, and to maintain a clean and unobstructed working area	
	2.21	Describe when to act on their own initiative and when to seek help and advice from others	
	2.22	State the importance of leaving the work area in a safe and clean condition on completion of activities (such as removing and storing power leads, cleaning the equipment and removing and disposing of waste)	

A large, stylized outline of the word 'eta' in a rounded, cursive-like font. The 'e' is gold, the 't' is black, and the 'a' is grey, matching the logo in the top right.

Level 1 Unit – Assembling composite components

Unit aim

This unit covers the skills and knowledge needed to prove the competences required to produce composite assemblies from composite and non-composite components. It will prepare the learner for entry into the engineering or manufacturing sectors, creating a progression between education and employment, or it will provide a basis for the development of additional skills and occupational competences in the working environment.

The learner will be expected to prepare for the composite assembly activities by obtaining all the necessary job instructions, materials, tools, equipment and any documentation that may be required.

In carrying out the assembly operations, the learner will be required to use appropriate or specified assembly and joining techniques and methods for the composite components to be assembled. This will include a range of features such as loose and close fit tolerances, permanent and non-permanent fixing, shape location, staggered, return and overlap joints. On completion of the composite assembly activities, the learner will be expected to return all tools and equipment to the correct location, and to leave the work area in a safe and tidy condition.

Unit introduction

The learner's responsibilities will require them to comply with health and safety requirements and organisational policy and procedures for the composite assembly activities undertaken. The learner will need to report any difficulties or problems that may arise with the assembly activities, and to carry out any agreed actions. 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 an understanding of their work and will enable them to apply appropriate composite assembly techniques and procedures safely. The learner will understand the composite assembly techniques used, and their application, and will know about the equipment, materials and consumables, to the required depth to provide a sound basis for carrying out the activities to the required specification.

The learner will understand the safety precautions required when carrying out the composite assembly activities, and when using the associated tools and equipment. 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

To achieve this unit, the learner needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria determine the standard required to achieve the unit through a variety of assessment methods appropriate to the delivery environment.

Unit Reference Number		H/504/6388
Qualification Framework		RQF
Title		Assembling composite components
Unit Level		Level 1
Guided Learning Hours		59
Unit Credit Value		9
Unit Grading Structure		Pass / Fail

Learning Outcome		Assessment Criteria - The learner can		Criteria expansion
1.	Assembling composite components	1.1	Work safely at all times, complying with health and safety legislation, regulations and other relevant guidelines	
		1.2	Carry out all of the following during the composite assembly activities: <ul style="list-style-type: none"> • adhere to procedures or systems in place for risk assessment, COSHH, personal protective equipment (PPE) and other relevant safety regulations • follow job instructions, assembly drawings and procedures • use the correct tools and equipment for the activity, and ensure that they are safe to use • ensure that components to be used are of the correct type, and that all mouldings are free from defects • apply safe and appropriate assembly techniques at all times • return all tools and equipment to the correct location on completion of the assembly activities 	
		1.3	Obtain the appropriate components, tools and equipment	
		1.4	Use the appropriate methods and techniques to assemble the components in their correct positions	
		1.5	Produce composite assemblies for one of the following: <ul style="list-style-type: none"> • one-off assemblies • batch assemblies • assembly line 	
		1.6	Produce composite assemblies that incorporate two of the following features: <ul style="list-style-type: none"> • loose fit tolerances • close fit tolerances • non-permanent fixing 	

		<ul style="list-style-type: none"> • shape location • joggle joins • permanent fixing • return joins • overlap joins 	
	1.7	Produce composite assemblies that require two of the following methods to be used: <ul style="list-style-type: none"> • trimming/fettling • pinning • clamping • trial fitting • aligning • use of assembly jigs • drilling • countersinking/counterboring 	
	1.8	Produce composite assemblies that use one of the following joining methods: <ul style="list-style-type: none"> • thread inserts • quick-release fasteners • rivets • mechanical fasteners • anchor nuts • bonding/adhesives 	
	1.9	Use one of the following types of composite component in the assemblies: <ul style="list-style-type: none"> • trim • closing panels • body panels • tubes • structural components • aerodynamic components • core materials • sections • housings • inserts • other specific components 	
	1.10	Use one of the following types of non-composite components in the assemblies: <ul style="list-style-type: none"> • brackets • fixtures • fittings 	

			<ul style="list-style-type: none"> • trim • tapes • memory foam • films • other specific components 	
		1.11	Secure the components, using the specified methods and securing devices	
		1.12	Check that all the required assembly operations have been completed to specification	
		1.13	Produce assemblies which comply with all of the following: <ul style="list-style-type: none"> • assemblies are dimensionally accurate within specification requirements • all components are correctly assembled and aligned, in accordance with the specification • all fastenings are correctly fitted and are secure • where appropriate, moving parts are correctly adjusted and have appropriate clearances • finished assemblies meet the required shape/geometry and are free from defects (such as square, straight, angle, free from twists) 	
		1.14	Report any difficulties or problems that may arise with the moulding activities, and carry out any agreed actions	
		1.15	Leave the work area in a safe and tidy condition on completion of the assembly activities	
2.	Know how to assemble composite components	2.1	State the health and safety precautions to be taken, and the procedures to be used, when producing composite assemblies and working with composite materials, consumables, tools and equipment in the specific work area	
		2.2	State the hazards associated with assembling composite materials, and with the consumables, tools and equipment used, and how to minimise these in the work area	
		2.3	State the protective equipment that is needed for personal protection (PPE) and, where required, the protection of others	
		2.4	State the specific workshop environmental conditions the must be observed when producing composite assemblies (such as temperature, humidity, styrene levels to threshold limits, fume/dust extraction systems and equipment)	
		2.5	Describe how to use and extract information from engineering drawings and related specifications (to include symbols and conventions to appropriate British, European or relevant International standards in relation to work undertaken)	
		2.6	Describe how to use the correct system of measurement such as metric and imperial	
		2.7	Describe terminology used for the composite assembly activities (such as types of components used, types of fittings and fasteners, materials and adhesives used)	
		2.8	Describe preparations to be undertaken on the composite components prior to assembly	

	2.9	State the assembly/joining methods, techniques and procedures to be used, and the importance of adhering to these procedures (such as screw fasteners, rivets, special purpose fittings)	
	2.10	Describe where appropriate, the application of sealants and adhesives within the assembly activities, and the precautions that must be taken when working with them	
	2.11	Describe how the components are to be aligned, adjusted, positioned and clamped prior to assembly, and the tools and equipment that is used	
	2.12	State the tools and equipment used in assembly activities, and how to check that the tools and equipment to be used are in a safe and serviceable condition	
	2.13	State the problems that can occur with the assembly activities, and how they can be avoided	
	2.14	Describe when to act on their own initiative and when to seek help and advice from others	
	2.15	State the importance of leaving the work area in a safe and clean condition on completion of the assembly activities (such as returning hand tools and equipment to the designated location, cleaning the work area, and removing and disposing of waste)	