

Pearson BTEC Level 2 Certificate in Improving Performance for Manufacturing Engineering Operations

Specification

BTEC specialist qualification

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Issue 2

Edexcel, BTEC and LCCI qualifications

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This specification is Issue 2. Key changes are listed in the summary table on the next page. We will inform centres of any changes to this issue. The latest issue can be found on the Pearson website: qualifications.pearson.com

This qualification was previously known as:

Edexcel BTEC Level 2 Certificate in Improving Performance for Manufacturing Engineering Operations (QCF)

The QN remains the same.

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Summary of Pearson BTEC Level 2 Certificate in Improving Performance for Manufacturing Engineering Operations specification Issue 2 changes

Summary of changes made between previous Issue 1 and this current Issue 2	Page/section number
All references to QCF have been removed throughout the specification	Throughout
Definition of TQT added	Section 1
Definition of sizes of qualifications aligned to TQT	Section 1
TQT value added	Section 2
Reference to credit transfer within the QCF removed	Section 6
QCF references removed from unit titles and unit levels in all units	Section 11
Guided learning definition updated	Section 11

Earlier issue(s) show(s) previous changes.

If you need further information on these changes or what they mean, contact us via our website at: qualifications.pearson.com/en/support/contact-us.html.

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Purpose of this specification

This specification sets out:

- the qualification's objective
- any other qualification which a learner must have completed before taking the qualification
- any prior knowledge, skills or understanding which the learner is required to have before taking the qualification
- units which a learner must have completed before the qualification will be awarded and any optional routes
- any other requirements which a learner must have satisfied before the learner will be assessed or before the qualification will be awarded
- the knowledge, skills and understanding which will be assessed as part of the qualification (giving a clear indication of their coverage and depth)
- the method of any assessment and any associated requirements relating to it
- the criteria against which learners' level of attainment will be measured (such as assessment criteria)
- any specimen materials
- any specified levels of attainment.

1 Introducing BTEC Specialist qualifications

BTEC Specialist qualifications are work-related qualifications available from Entry to Level 3 in a range of sectors. They give learners the knowledge, understanding and skills they need to prepare for employment in a specific occupational area. The qualifications also provide career development opportunities for those already in work. The qualifications may be offered as full-time or part-time courses in schools or colleges. Training centres and employers may also offer these qualifications.

Sizes of Specialist qualifications

For all regulated qualifications, we specify a total number of hours that learners are expected to undertake in order to complete and show achievement for the qualification – this is the Total Qualification Time (TQT). The TQT value indicates the size of a qualification.

Within the TQT, we identify the number of Guided Learning Hours (GLH) that a centre delivering the qualification needs to provide. Guided learning means activities that directly or immediately involve tutors and assessors in teaching, supervising, and invigilating learners, for example lectures, tutorials, online instruction and supervised study.

As well as guided learning, there may be other required learning that is directed by tutors or assessors. This includes, for example, private study, preparation for assessment and undertaking assessment when not under supervision, such as preparatory reading, revision and independent research.

As well as TQT and GLH, qualifications can also have a credit value – equal to one tenth of TQT, rounded to the nearest whole number.

TQT and credit values are assigned after consultation with users of the qualifications.

BTEC Specialist qualifications are available in the following sizes:

- Award – a qualification with a TQT value of 120 or less (equivalent to a range of 1–12 credits)
- Certificate – a qualification with a TQT value in the range of 121–369 (equivalent to a range of 13–36 credits)
- Diploma – a qualification with a TQT value of 370 or more (equivalent to 37 credits and above).

2 Qualification summary and key information

Qualification title	Pearson BTEC Level 2 Certificate in Improving Performance for Manufacturing Engineering Operations
Qualification Number (QN)	600/3050/1
Date registrations can be made	01/06/2012
Age range that the qualification is approved for	16-18 18+ 19+
Credit value	13
Assessment	Centre-devised assessment (internal assessment)
Total Qualification Time (TQT)	130
Guided learning hours	90
Grading information	The qualification and units are at pass grade.
Entry requirements	No prior knowledge, understanding, skills or qualifications are required before learners register for this qualification. However, centres must follow the Pearson Access and Recruitment policy (see <i>Section 9: Access and Recruitment</i>)

Qualification title and Qualification Number

Centres will need to use the Qualification Number (QN) when they seek public funding for their learners. The qualification title, unit titles and QN are given on each learner's final certificate. You should tell your learners this when your centre recruits them and registers them with us. There is more information about certification in our *UK Information Manual*, available on our website, qualifications.pearson.com

Objective of the qualification

The Pearson BTEC Level 2 Certificate in Improving Performance for Manufacturing Engineering Operations is for learners who work in, or want to work in, Manufacturing Engineering.

It gives learners the opportunity to:

- develop knowledge related to manufacturing engineering
- develop a range of skills and techniques, personal skills and attributes essential for successful performance in working life.
- learn about operations in the manufacturing engineering industry
- achieve a nationally-recognised Level 2 qualification
- develop their own personal growth and engagement in learning

Progression opportunities through Pearson qualifications

Learners who have achieved the Certificate can progress on to the Pearson BTEC Level 3 Diploma and Extended Diploma in Mechanical Engineering.

See *Annexe A* for further information.

Industry support and recognition

This qualification is supported by SEMTA, the SSC for the engineering sector.

Relationship with National Occupational Standards

This qualification relates to the National Occupational Standards in SEMTA. The mapping document in *Annexe B* shows the links between the units within this qualification and the National Occupational Standards.

3 Centre resource requirements

As part of the approval process, centres must make sure that the resources requirements below are in place before offering the qualification.

General resource requirements

- Centres must have appropriate physical resources (for example, equipment, IT, learning materials, teaching rooms) to support the delivery and assessment of the qualification.
- Staff involved in the assessment process must have relevant expertise and occupational experience.
- There must be systems in place to make sure continuing professional development for staff delivering the qualification.
- Centres must have appropriate health and safety policies in place relating to the use of equipment by learners.
- Centres must deliver the qualifications in accordance with current equality legislation.

Specific resource requirements

BTEC Firsts are designed to prepare learners for employment in specific occupational sectors. Physical resources need to support the delivery of the programme and the proper assessment of the learning outcomes and should, therefore, normally be of industry standard. Staff delivering programmes and conducting the assessments should be familiar with current practice and standards in the sector concerned. Centres will need to meet any specific resource requirements to gain approval from Pearson.

It is also essential that learners have access to computers and the internet to enable them to access current legislation and regulations as required.

Where specific resources are required, these have been indicated in individual units in the *Essential resources* sections.

As well as the general requirements above, there are specific resource requirements that centres must meet:

Access to a workshop environment and the range of tools required to carry out engineering work activities is essential. Learners will also need access to relevant legislation applicable to the working environment, emergency procedures and policies.

4 Qualification structure

Pearson BTEC Level 2 Certificate in Improving Performance for Manufacturing Engineering Operations

The learner will need to meet the requirements outlined in the table below before Pearson can award the qualification.

Total number of credits that must be achieved	13
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Unit	Unique Reference Number	Mandatory units	Level	Credit	Guided Learning Hours
1	F/503/4698	Health and Safety for Manufacturing Engineers	2	3	20
2	J/503/4699	Communicating Effectively in Manufacturing Engineering Workplaces	2	3	20
3	M/503/4700	Working Effectively in Manufacturing Engineering	2	2	10
4	T/503/4701	Working Relationships in Manufacturing Engineering	2	2	10
5	D/602/4769	Understanding Employment Responsibilities and Rights	2	3	30

5 Assessment

The table below gives a summary of the assessment methods used in the qualification.

Units	Assessment method
All units	Portfolio of Evidence

Centre-devised assessment (internal assessment)

Each unit has specified learning outcomes and assessment criteria. To pass an internally assessed unit, learners must meet all the learning outcomes. Centres may find it helpful if learners index and reference their evidence to the relevant learning outcomes and assessment criteria.

Centres need to write assignment briefs for the learners to show what evidence is required. Assignment briefs should indicate clearly, which assessment criteria are being targeted.

Assignment briefs and evidence produced by learners must also meet any additional requirements in the *Information for tutors* section of the unit.

Unless otherwise indicated within *Information for tutors*, the centre can decide what form assessment evidence will take (eg performance observation, presentations, projects, tests, extended writing) as long as the methods chosen allow learners to produce valid, sufficient and reliable evidence of meeting the assessment criteria.

Centres are encouraged to provide learners with realistic scenarios and maximise the use of practical activities in delivery and assessment.

Opportunities to link the delivery and assessment of units with other units should also be encouraged to avoid over assessment.

Further guidance about internal assessment is on the Pearson website. See Section 12 for further details.

6 Recognising prior learning and achievement

Recognition of Prior Learning

Recognition of Prior Learning (RPL) is a method of assessment (leading to the award of credit) that considers whether a learner can demonstrate that they can meet the assessment requirements for a unit through knowledge, understanding or skills they already possess and so do not need to develop through a course of learning.

Pearson encourages centres to recognise learners' previous achievements and experiences in and outside the workplace, as well as in the classroom. RPL provides a route for the recognition of the achievements resulting from continuous learning.

RPL enables recognition of achievement from a range of activities using any valid assessment methodology. If the assessment requirements of a given unit or qualification have been met, the use of RPL is acceptable for accrediting a unit, units or a whole qualification. Evidence of learning must be sufficient, reliable and valid.

Further guidance is available in our policy document *Recognition of Prior Learning Policy and Process*, available on our website, qualifications.pearson.com

7 Quality assurance of centres

Quality assurance is at the heart of vocational qualifications. The centre assesses BTEC qualifications. The centre will use quality assurance to make sure that their managers, internal verifiers and assessors are standardised and supported. Pearson use quality assurance to check that all centres are working to national standards. It gives us the opportunity to identify and provide support, if needed, to safeguard certification. It also allows us to recognise and support good practice.

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

- 1 Delivery of the qualification as part of a BTEC apprenticeship (single click registration)
 - an annual visit by a Standards Verifier to review centre-wide quality assurance systems and sampling of internal verification and assessor decisions
- 2 Delivery of the qualification outside the apprenticeship
 - an annual visit to the centre by a Centre Quality Reviewer to review centre-wide quality assurance systems
 - Lead Internal Verifier accreditation. This involves online training and standardisation of Lead Internal Verifiers using our OSCA platform, accessed via Edexcel Online. Please note that not all qualifications will include Lead Internal Verifier accreditation. Where this is the case, we will annually allocate a Standards Verifier to conduct postal sampling of internal verification and assessor decisions for the Principal Subject Area.

For further details, go to the *UK BTEC Quality Assurance Handbook* on our website qualifications.pearson.com.

8 Programme delivery

Centres are free to offer the qualifications using any mode of delivery (for example full time, part time, evening only, distance learning) that meets their learners' needs. Whichever mode of delivery is used, centres must make sure that learners have access to the resources identified in the specification and to the subject specialists delivering the units.

Those planning the programme should aim to enhance the vocational nature of the qualification by:

- liaising with employers to make sure a course is relevant to learners' specific needs
- accessing and using non-confidential data and documents from learners' workplaces
- developing up-to-date and relevant teaching materials that make use of scenarios that are relevant to the sector
- giving learners the opportunity to apply their learning in practical activities
- including sponsoring employers in the delivery of the programme and, where appropriate, in the assessment
- making full use of the variety of experience of work and life that learners bring to the programme.

Where a unit is externally assessed, it is essential that learners have covered all of the *Unit amplification* before they are tested.

Centres must make sure that current legislation is taught when it is part of a unit.

9 Access and recruitment

Pearson's policy regarding access to our qualifications is that:

- they should be available to everyone who is capable of reaching the required standards
- they should be free from any barriers that restrict access and progression
- there should be equal opportunities for all those wishing to access the qualifications.

Centres are required to recruit learners to BTEC specialist qualifications with integrity.

Applicants will need relevant information and advice about the qualification to make sure it meets their needs.

Centres should review the applicant's prior qualifications and/or experience, considering whether this profile shows that they have the potential to achieve the qualification.

For learners with disabilities and specific needs, this review will need to take account of the support available to the learner during teaching and assessment of the qualification. The review must take account of the information and guidance in *Section 10, Access to qualifications for learners with disabilities or specific needs*.

10 Access to qualifications for learners with disabilities or specific needs

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- there should be equal opportunities for all those wishing to access the qualifications.

Centres are required to recruit learners to BTEC Specialist qualifications with integrity.

Applicants will need relevant information and advice about the qualification to make sure it meets their needs.

Centres should review the applicant's prior qualifications and/or experience, considering whether this profile shows that they have the potential to achieve the qualification.

For learners with disabilities and specific needs, this review will need to take account of the support available to the learner during teaching and assessment of the qualification. The review must take account of the information and guidance in *Section 11 Access to qualifications for learners with disabilities or specific needs*.

Learners may be aged between 14 and 16 and therefore potentially vulnerable. Where learners are required to spend time and be assessed in work settings, it is the centre's responsibility to ensure that the work environment they go into is safe.

11 Units

Unit format

Units have the following sections.

Unit title

This is the formal title of the unit that will appear on the learner's certificate.

Unit reference number

Each unit is assigned a unit reference number that appears with the unit title on the Register of Regulated Qualifications.

Level

All units and qualifications have a level assigned to them. The level assigned is informed by the level descriptors defined by Ofqual, the qualifications regulator.

Credit value

When a learner achieves a unit, they gain the specified number of credits.

Guided learning hours

Guided Learning Hours (GLH) is the number of hours that a centre delivering the qualification needs to provide. Guided learning means activities that directly or immediately involve tutors and assessors in teaching, supervising, and invigilating learners, for example lectures, tutorials, online instruction and supervised study.

Unit aim

This gives a summary of what the unit aims to do.

Essential resources

This section lists any specialist resources that are needed to deliver the unit. The centre will be asked to make sure that these resources are in place when it seeks approval from Pearson to offer the qualification.

Learning outcomes

The learning outcomes of a unit set out what a learner knows, understands or is able to do as the result of a process of learning.

Assessment criteria

The assessment criteria specify the standard required by the learner to achieve the learning outcome.

Unit amplification

This section gives further clarification on what a learner needs to know to achieve a learning outcome. Information in brackets gives exemplification for specific areas of knowledge.

Information for tutors

This section gives tutors' information on delivery and assessment. It usually contains the following subsections.

- *Delivery* – explains the content's relationship to the learning outcomes and offers guidance on possible approaches to delivery.
- *Assessment* – gives information about the evidence that learners must produce, together with any additional guidance if appropriate. This section should be read in conjunction with the assessment criteria.
- *Indicative resource materials* – lists resource materials that can be used to support the teaching of the unit, for example books, journals and websites.

Unit 1: Health and Safety for Manufacturing Engineers

Unit reference number: F/503/4698

Level: 2

Credit value: 3

Guided learning hours: 20

Unit aim

This unit aims to give learners an understanding of statutory regulations and organisational safety requirements to enable them to work safely, efficiently and effectively in manufacturing engineering.

The ability to work safely in an engineering environment is essential for the wellbeing of oneself and others.

The aim of this unit is to deal with the essential working practices of engineering to ensure that learners appreciate potential hazards. This way, learners can enjoy all the challenges that an engineering profession can offer without undue fear for their own safety or for that of others.

The unit starts by considering the importance of health and safety legislation and the roles and responsibilities of individuals within engineering organisations. Learners will examine the hazards and risks associated with an engineering activity including the working environment (for example, working at height), the use of tools and equipment, and working with materials and substances that may cause harm. Learners will need to identify and understand the use of the most appropriate personal protective equipment (for example, eye or hand protection) when undertaking particular engineering activities. A key focus of the unit is learners acquiring an awareness of the dangers of not working within appropriate legislation and procedures. In the event of an incident, it is essential that learners know how to respond. The unit will take learners through typical incidents that they may have to deal with at some point in their career (for example, contacting the first aider, sounding alarms, stopping machinery).

The unit will enable learners to develop the skills and understanding required to carry out a range of engineering tasks. The unit is an essential tool kit for learners entering an engineering environment. The skills and knowledge gained through studying this unit will be put to good use in other areas of study and everyday working life.

Essential resources

For this unit, centres need Access to a workshop environment and the range of tools required to carry out engineering work activities is essential. Learners will also need access to relevant legislation applicable to the working environment, emergency procedures and policies.

It is also essential that learners have access to computers and the internet to enable them to access current legislation and regulations as required.

Learning outcomes, assessment criteria and unit amplification

To pass 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.

Learning outcomes		Assessment criteria		Unit amplification
1	Know the importance of health and safety in manufacturing engineering workplaces	1.1	state the legislation that covers health and safety in manufacturing engineering workplaces	<ul style="list-style-type: none"> □ <i>Health and safety legislation:</i> e.g. Health and Safety at Work Act 1974 and other current and relevant legislation applicable to the working environment □ <i>Own and others' roles and responsibilities:</i> e.g. management of health and safety at work regulations, workplace health and safety and welfare regulations, personal and protective equipment at work regulations, manual handling operations regulations; sources of information and guidance within an organisation; using equipment safely e.g. mechanical, electrical, fluid power equipment; lifting and carrying techniques; housekeeping e.g. tidy workspace, protecting others from harm e.g. as a result of work being carried out by self or others substances regulations
		1.2	identify the health and safety responsibilities of individuals in manufacturing engineering workplaces	
2	Know potential risks and hazards in manufacturing engineering workplaces	2.1	identify potential risks and hazards in manufacturing engineering workplaces	<ul style="list-style-type: none"> □ <i>Risk and hazards:</i> working environment e.g. working at height, electricity, confined spaces, hot work; tools and equipment; materials and substances; dangers of not working to laid down procedures □ <i>Risk assessment:</i> e.g. Health and Safety Executive (HSE) '5 steps to risk assessment' including identifying hazards, deciding who might be at harm and how, evaluation of the risks and control measures, recording of findings and implementation, review of risk assessment and update when necessary □ <i>Hazard warning signs:</i> identification of warning signs for the seven main groups of hazardous substances e.g. defined by classification, packaging and labelling of dangerous

Learning outcomes		Assessment criteria		Unit amplification
		2.2	describe how potential risks and hazards can be reduced in manufacturing engineering workplaces	
		2.2	describe the importance of correct punctuation in written communications	
		2.3	describe hazard warning signs and symbols used in manufacturing engineering workplaces	
3	Understand the use of personal protective equipment in manufacturing engineering workplaces	3.1	explain the need for personal protective equipment in manufacturing engineering workplaces	<ul style="list-style-type: none"> □ <i>Personal protective equipment (PPE)</i>: appropriate to task undertaken e.g. overalls, protective footwear, eye protection, masks/respirators and gloves
		3.2	describe the different types of personal protective equipment used in manufacturing engineering workplaces	

Learning outcomes		Assessment criteria		Unit amplification
4	Know the emergency procedures in manufacturing engineering workplaces	4.1	describe evacuation procedures for a manufacturing engineering workplace	<ul style="list-style-type: none"> □ <i>Emergency procedures</i>: manufacturing engineering workplace emergencies (chemical spillage, work hazards, fire); actions in the event of an emergency e.g. types and sounding/initiating emergency alarm, evacuation procedure and escape routes □ <i>Fire extinguishers</i>: e.g. classification under BS EN3 part 5 according to the main type of fuel involved: Class A – fires involving flammable solids, Class B – fires involving flammable liquids and liquefiable solids, Class C – fires involving flammable gases, Class D – fires involving flammable metals, Class E – fires involving electrical hazards, Class F – fires involving cooking oils and fats; colour coding of water, foam, dry powder, CO2 gas, wet chemical types
		4.2	describe the different types of fire extinguisher and their applications	
5	Understand accident procedures in manufacturing engineering workplaces	5.1	explain why accidents and incidents must be reported	<ul style="list-style-type: none"> □ <i>Accident procedures</i>: manufacturing engineering workplace accidents (accident/injury, trips or falls); reporting routines e.g. at assembly point, hazards and malfunctions, injury, near-miss occurrences; identification of appropriate qualified persons e.g. first aider, fire warden
		5.2	describe procedures for reporting accidents and incidents	
		5.3	state where to obtain assistance to deal with injuries.	

Information for tutors

Delivery

This unit should be delivered using lectures, tutor demonstrations and practical engineering activities. During the delivery of the unit, centres must ensure sufficient coverage of the learning outcomes and content. Examples are given in the content to give centres an idea of the typical range of areas that might be covered. For example, in the section on emergency procedures, it suggests 'identification of appropriate qualified persons e.g. first aider, fire warden'. For assessment purposes, one of these would be sufficient. However, when preparing the delivery strategy it is expected that learners will be provided with the skills to identify the appropriately qualified person(s) for both injuries and fire.

It would not be appropriate for this unit to be taught without any practical application. For example, identifying hazards and the risks associated with an engineering activity from an image (e.g. drawing, sketch, photograph) does not have the same value that real practical experience in a working environment can bring. Centres are encouraged to find innovative ways of bringing the unit to life, giving it true relevance for the learner. This will generally be achieved through the use of practical, hands-on experience, which can be achieved during workshop activities or through actual workplace experience.

Delivery of the engineering work activity will require access to an engineering workshop environment and relevant tools and equipment. Learners could be provided with a range of simple engineering tasks that will enable them to practise their skills and during which support and guidance can be given. Note that the use of 'e.g.' in the content is to give an indication and illustration of the breadth and depth of the area or topic. As such, not all content that follows an 'e.g.' needs to be taught or assessed.

Assessment

Part of the assessment evidence for this unit could come from practical activities. These could be carried out solely for the purpose of this unit but, equally, could be the activities associated with other units or from work-based evidence.

To achieve the pass grade, the criteria 1.1, 1.2 may require a written report testing the knowledge of a range of legislation and roles and responsibilities of individuals associated with the engineering workplace. In addition, practical applications of using equipment safely, lifting and carrying techniques and housekeeping are necessary to achieve the criteria and these could be accessed through tutor/witness observations.

Centres will need to consider how to support the process evidence (e.g. tutor/witness observation, oral questioning) with product evidence, for example, the use of a task sheet/logbook/diary in which the learner can note the PPE they have selected for a particular engineering task and the reasons for choice (3.1, 3.2) and the identification of hazards and risks associated with that task (2.1, 2.2). It would then be possible for the tutor, through observation and/or oral questioning, to easily verify this product evidence. Also, essential information should be provided to identify a range of personnel responsible for incident and fire safety within an organisation to address (5.3). 5.1 could be addressed through written media in the form of a warning notice/poster for new employees.

Simulation may be appropriate in some cases to cover certain criteria such as 4.1, 5.2 as these may not always naturally occur and even if they did, assessment would not be the highest priority at the time!

To achieve 4.2, again this could be evidenced through tutor/witness observation of appropriate fire extinguisher selection for given engineering emergencies. The risk assessment criteria (2.1, 2.2) could be achieved either through an inspection of part of the centre's workshops or through work-based evidence. The important aspect of the evidence is the learner's ability to make recommendations based on their practical experiences, the safety of materials and equipment handling, the use of personal protective equipment, and the potential hazards in a new and possibly, but not necessarily, unfamiliar area.

Indicative resource materials

Textbooks

Boyce A, Clarke S, Darbyshire A, Mantovani B and Weatherill B – *BTEC Level 2 First Engineering Student Book* (Pearson, 2010) ISBN 9781846907234

Boyce A, Clarke S, Darbyshire A, Mantovani B and Weatherill B – *BTEC Level 2 First Engineering Teaching Resource Pack* (Pearson, 2010) ISBN 9781846907258

Health and Safety Executive – *Essentials of Health and Safety at Work* (HSE Books, 2006) ISBN 9780717661794

Health and Safety Executive – *Health and Safety in Engineering Workshops* (HSE Books, 2004) ISBN 9780717617173

Websites

www.hse.org – Health and Safety Executive

Unit 2: Communicating Effectively in Manufacturing Engineering Workplaces

Unit reference number: J/503/4699

Level: 2

Credit value: 3

Guided learning hours: 20

Unit aim

This unit gives learners the opportunity to understand the effectiveness of a range of communication methods used within manufacturing engineering workplaces. These methods include verbal and non-verbal methods, the communication of technical information and the importance of correct punctuation.

Effective communication is important in all walks of life. Speaking, reading and listening skills are for all learners. The language and communication skills required in a manufacturing engineering environment go beyond this, with particular conventions and techniques unique to the industry being essential for effective communication.

The aim of this unit is to introduce learners to the importance of appropriate communication within the manufacturing engineering industry. Learners will be introduced to the factors that impact upon effective communication, including verbal and non-verbal communication, the importance of punctuation in written work and the different approaches required when communicating with people external to a manufacturing engineering organisation. Manufacturing engineering uses a variety of specific terminology and communication methodologies and this unit will introduce learners to the types of technical information found in manufacturing engineering workplaces and the importance of using the correct terminology when communicating technical information.

Developing an understanding of the importance of effective communication, prepares learners for further study. The unit seeks to introduce learners to the specific communication requirements of the manufacturing engineering industry as it provides an introduction to the key principles applied in a vocational context, preparing learners for the workplace.

Essential resources

Access to information and communication technology resources (including the internet) is vital. Learners should be provided with a variety of sample written material, engineering drawings, graphs, catalogues, tables, sketches and circuit diagrams.

Learning outcomes, assessment criteria and unit amplification

To pass 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.

Learning outcomes		Assessment criteria		Unit amplification
1	Understand the importance of communication in manufacturing engineering workplaces	1.1	describe the importance of communication in manufacturing engineering workplaces	<ul style="list-style-type: none"> □ <i>Importance</i>: e.g. to inform, to confirm, to specify, to make a request, to instruct □ <i>Methods</i>: written documents e.g. letters, emails, reports, specifications; graphical techniques e.g. charts, graphs, tables, diagrams; drawings e.g. 2D, 3D, circuit diagrams, block diagrams □ <i>Given situations</i>: solving problems e.g. production stoppages, machine breakdown, supply chain issues; audience e.g. individuals, teams, customers, suppliers; quality issues e.g. products out of specification, over specification of products, assembly issues
		1.2	describe communication methods in manufacturing engineering workplaces	
		1.3	justify communication methods for given situations in manufacturing engineering workplaces	
2	Understand effective communication in manufacturing engineering workplaces	2.1	identify the factors to consider when communicating verbally	<ul style="list-style-type: none"> □ <i>Verbal</i>: speaking e.g. with supervisors, colleagues, using appropriate language; use of body language; listening skills e.g. taking notes, understanding and interpreting instructions, questioning techniques including open and closed questions □ <i>Punctuation</i>: sentence construction e.g. use of capital letters, full stops, commas; use of punctuation characters e.g. brackets, question marks, currency symbols □ <i>External people</i>: messages to suit different situations; formal and informal verbal communication e.g. telephone contacts, meetings; written communication e.g. letters, e-mails
		2.2	describe the importance of correct punctuation in written communications	
		2.3	describe the factors to consider when communicating with people external to a manufacturing engineering organisation	

Learning outcomes		Assessment criteria		Unit amplification
3	Understand how to communicate technical information in manufacturing engineering workplaces	3.1	Understand how to communicate technical information in manufacturing engineering workplaces	<ul style="list-style-type: none"> □ <i>Technical information</i>: written documents; technical drawings e.g. 2D and 3D drawings, sketches, part drawings, assemblies; circuit diagrams e.g. electrical, electronic, hydraulic, pneumatic; specifications e.g. assembly instructions, manufacturing schedules, maintenance plans, production plans; technical data eg trade journals, manufacturer catalogues, data sheets, analysis software □ <i>Terminology</i>: use of relevant technical language; graphical information e.g. labelling, use of scale, colour; conventions e.g. layout, line types, hatching, dimensions, tolerances, scale; use of symbols e.g. surface finish, circuit symbols, projection; standards e.g. British (BSI), International (ISO)
		3.2	explain the importance of using correct terminology to communicate technical information in manufacturing engineering workplaces.	

Information for tutors

Delivery

This unit could be delivered in the early part of the programme of study, helping learners to communicate effectively in other units. Learners should be given the opportunity to develop communication skills and complete practical activities, which will allow them to practise using written and verbal communication techniques in an engineering manufacture context.

Tutors should be aware that some formal input might be required. It may be helpful to link this with other units, involving visits to local manufacturing engineering enterprises, where learners can begin to investigate the importance of communicating effectively in manufacturing engineering workplaces by asking prepared questions. Tutors could help learners to devise a selection of appropriate questions focusing on this purpose.

Development of written and graphical communication skills will require some formal input on the range of punctuation and formats used in manufacturing engineering documents. Similarly, input on the layout employed in graphical communication and types of terminology employed in the communication of technical information will be required. Sample documents are essential to illustrate to learners the differing layout, and format, of given documents and how similar documents (for example specifications and technical drawings) can vary and still serve the same purpose. Although an understanding of communication techniques and technical terminology is vital to an appreciation of effective communication, a competency in engineering drawing techniques is not a requirement for successful completion of this unit.

Effective written and verbal communication impacts on all aspects of successful manufacturing engineering workplaces. Learners need to understand the implications of poor or inaccurate communication. Providing examples of different types of documentation will allow learners to begin to understand the importance of layout, style and format. Written documentation could be a simple telephone message or e-mail. However, a consideration of examples of more formal documentation such as catalogues, technical drawings, letters, circuit diagrams and graphs will need to be demonstrated. Learners should be encouraged to focus on the impact of poor presentation, incorrect information or errors in punctuation.

In a similar manner, examples of verbal communication can be considered with learners recognising the implication of tone, body language and oral presentation on the effectiveness of the message being conveyed.

Learners would benefit from the opportunity to choose which formats might be suitable for given tasks set for them by the tutor. Developing written and graphical documentation as well as presenting verbally will enable learners to explore the need to think carefully about the nature of the communication medium being used, its intended audience and fitness for purpose. Learners will also benefit from links with local manufacturing engineering businesses that may be able to provide copies of documents used in their workplaces, adding vocational context. Learners may also use their own experiences from work placements or part-time employment.

Note that the use of 'e.g.' in the content is to give an indication and illustration of the breadth and depth of the area or topic. As such, not all content that follows an 'e.g.' needs to be taught or assessed.

Assessment

Assessment of this unit could be facilitated using a mix of practical and written activities, which could be associated with other units or delivered as stand-alone assessments. To pass this unit learners should provide evidence which satisfies all of the listed pass criteria. Although this can be achieved using a portfolio-based approach, it might be better facilitated using a series of assignments.

Pass criterion 1.1 requires learners to describe the importance of communication in manufacturing engineering workplaces. Learners should identify why effective communication is important and the methods that can be employed to ensure communication is clear, unambiguous and understood (1.2). In order to describe communication methods learners could be given specific communication methods or scenarios, allowing them to use a table or task sheet to present their descriptions of the given methods. 1.3 requires learners to justify communication methods for given situations in manufacturing engineering workplaces. In order to evidence this learner should be demonstrating the use of different communication techniques in different situations and contexts. This could be linked to the activity providing evidence for 1.2. Given situations should be case studies, or scenarios, provided by the tutor, in order to allow learners to provide a range of possible methods of communication. They can then subsequently demonstrate why they have selected particular methods depending upon the situation.

Pass criterion 2.1 requires learners to identify the factors to consider when communicating verbally. Learners should be considering the use of appropriate language depending upon whom they are speaking to, and their use of body language and the messages this conveys. They should also consider listening skills and how they can use note taking, questioning techniques and other methods to ensure they have understood correctly. A presentation allowing learners to demonstrate these verbal communication techniques, perhaps using video evidence, could allow demonstration of these skills. These elements could be assessed with the use of checklists or observation records/witness testimonies that demonstrate understanding. This could be supported by the use of presentation slides or PowerPoint presentations that describe the importance of the use of appropriate punctuation in communicating (2.2) and how different factors have to be considered when communicating with people external to a manufacturing engineering organisation (2.3).

To ensure that learners can identify the types of technical information found in manufacturing engineering workplaces (3.1) centres should consider developing an activity that requires the range of sources of technical information outlined in the unit content to be evidenced. Learners could research or use a range of documents, drawings, circuit diagrams, specifications and technical data to produce a checklist or tabular approach identifying the types of technical information specified in the unit content. This could be supported by a written report that outlines the importance of using the correct terminology to communicate technical information in manufacturing engineering workplaces (3.2).

Indicative resource materials

Textbooks

Boyce A, Clarke S, Darbyshire A, Mantovani B and Weatherill B – *BTEC Level 2 First Engineering Student Book* (Pearson, 2010) ISBN 9781846907234

Boyce A, Clarke S, Darbyshire A, Mantovani B and Weatherill B – *BTEC Level 2 First Engineering Teaching Resource Pack* (Pearson, 2010) ISBN 9781846907258

Unit 3: Working Effectively in Manufacturing Engineering

Unit reference number: M/503/4700

Level: 2

Credit value: 2

Guided learning hours: 20

Unit aim

This unit introduces learners to the planning that takes place before manufacturing engineering processes and operations commence. The importance of professional development and performance review is introduced and learners will also develop an understanding of the importance of effective housekeeping and techniques to maintain a safe and efficient work area.

Manufacturing engineering operations can vary from small-scale production of individual components to the mass production of highly complex assemblies. Planning and preparing the workplace for these manufacturing operations is an essential part of maintaining effective production in a competitive global marketplace. This unit introduces learners to the level of detail required when planning a manufacturing activity, including the key factors to be considered when preparing the workplace and developing a production schedule.

Providing a safe and streamlined workplace enhances efficient production and the principles of effective housekeeping processes are important to ensuring continued competitiveness. This unit allows learners to develop their understanding of the use of specific continuous improvement techniques and how these help to improve all aspects of the manufacturing engineering workplace.

The unit will also introduce learners to the importance of personal development to both employees and employers. Learners will develop an appreciation of the types and methods of professional development and also the importance of reviewing these on a regular basis. In addition, the concept of performance review is introduced and the principles of appraising employee performance are linked to development, efficiency, rewards and disciplinary issues.

Essential resources

Access to a workshop environment or facility that allows for the simulation of workplace activities is essential to appropriate contextualisation of much of the unit content. Learners will also need access to relevant information and communication technology resources (including the internet).

Learning outcomes, assessment criteria and unit amplification

To pass 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.

Learning outcomes		Assessment criteria		Unit amplification
1	Know the planning stages and preparation methods for manufacturing engineering activities	1.1	describe the planning stages for manufacturing engineering activities in the workplace	<ul style="list-style-type: none"> □ <i>Manufacturing plan</i>: details required for a production activity e.g. sequence of activities/processes, specifications (standards, drawings etc), raw materials and consumables to be used; scales of production e.g. jobbing; small batch, repeated batch, continuous production, flow production □ <i>Preparation</i>: production operations e.g. tools and equipment requirements, machine settings; inspection and quality procedures; health and safety precautions; environmental or legislative requirements
		1.2	describe the preparation methods for manufacturing engineering activities in the workplace	
2	Understand the importance of effective housekeeping in manufacturing engineering workplaces	2.1	state the importance of effective housekeeping in manufacturing engineering workplaces	<ul style="list-style-type: none"> □ <i>Housekeeping</i>: leaving the work area in a safe condition e.g. disposal of waste, storage of equipment; more efficient workplace e.g. improved quality, reduced lead times; prepare and maintain the area e.g. accessibility for receipt and removal of materials, freedom from obstructions and hazards
		2.2	describe how to implement effective housekeeping in manufacturing engineering workplaces	

Learning outcomes		Assessment criteria		Unit amplification
3	Understand the importance of continuous personal development in manufacturing engineering	3.1	describe personal development methods for manufacturing engineering staff	<ul style="list-style-type: none"> □ <i>Professional development</i>: to be able to do the job competently e.g. induction and initial preparation, introduction to the workplace; legal reasons e.g. health and safety, regulations; changing skills requirements e.g. new technology, multi-skilling training, making sure employees can do a number of jobs; training courses e.g. in-house courses, external courses at specialist training centres, vocational and professional courses using FE providers □ <i>Performance appraisal</i>: scheduled assessment of work performance e.g. shared agreement of objectives, periodic progress review, identification of problems; efficiency and effectiveness e.g. improved communication, disciplinary process, performance-related pay; identification of training needs e.g. new skills requirements, redeployment
		3.2	explain the importance of performance reviews and effective feedback	

Information for tutors

Delivery

This unit could be delivered through a combination of practical activities, tutor-led discussions, whole-class teaching and group/individual activities. During delivery of the unit centres must ensure that sufficient coverage of the learning outcomes and content takes place. Examples are given in the content to allow centres to determine the range of areas that might be covered. These examples are not exhaustive and centres may use these or their own to amplify and contextualise the unit content appropriately.

To facilitate understanding, visits to local manufacturing engineering enterprises could be arranged. Learners can begin to investigate the importance of planning and preparation methods, effective housekeeping and continuous personal development in manufacturing engineering workplaces. Pre-prepared questions could be used and tutors could help learners to devise a selection of appropriate questions focusing on this purpose.

Much of the unit can be delivered through practical activities and access to appropriate workshops would be beneficial, although the products considered need not be complex and activities could be simulated in a classroom environment.

The use of case studies and artefacts should be considered for the delivery of learning outcome 1. Learners should be preparing manufacturing plans for real products and simulating their production. This should include preparing the workspace and developing appropriate quality checks as well as selecting appropriate tools, equipment and materials. This activity could be linked to effective housekeeping and learners could carry out a 5S/C audit to ensure the workplace used for production is fit for purpose and prepared in order to simulate or carry out manufacturing operations.

The importance of personal development and review can be demonstrated through group work. Activities such as role play and case studies could be used to develop understanding and parallels could be drawn between the way learner performance is assessed within a school/college environment and how employee performance is measured. Similarly, the development needs of the business and the individual could be compared, with options and advice and guidance on the choices in education or training given to learners.

Assessment

Assessment of this unit could be facilitated using a mix of practical and written activities, which could be associated with other units or delivered as stand-alone assessments. To pass this unit learners should provide evidence which satisfies all of the listed pass criteria. Although this can be achieved using a portfolio-based approach, it might be better facilitated using a series of assignments.

Assessment criterion 1.1 could be evidenced with written responses describing the planning stages for a given engineering manufacturing activity. This could be a given artefact, case study or example from a local manufacturing engineering company. It is important that learners describe the planning stages required rather than simply listing the steps required. A manufacturing plan could be produced with descriptions appended or annotated using a tabular approach. This activity could be combined with an outline of the preparation methods required to ensure the workplace is suitably prepared for the manufacturing activity outlined in the given scenario. Once again it is important that learners describe the methods rather than simply listing or stating methods used.

Assessment criteria 2.1 and 2.2 could be combined with learners completing a review of a given workspace and then completing a simulated/actual 5S/C activity in the workspace. This activity could be linked to the first assignment in that the workplace activity could be carried out in preparation for the production of the artefact/case study/example previously used. An action plan could be completed to indicate the housekeeping issues observed and noting the importance of corrective action. Observation records could then be used to evidence the 5S/C activity, with learners responding to set questions in order to describe how they have implemented housekeeping activities and why they are important. Video/photographic evidence could be used to support the observations, although it is important to ensure that questions and activities allow learners to cover the required range outlined in the unit content.

Assessment criteria 3.1 and 3.2 could be assessed using a range of case studies; this range should be limited to only those that ensure that the range of personal development methods required can be evidenced. Learners could be tasked with producing a table or checklist that indicates the development method(s) required for each case study along with appropriate descriptions of these methods. Each case study could have a job role, person specification or job description related to it, to allow learners to consider the appropriate development strategies and methods for each case. One of the given case studies could include a performance review document. Learners could review this and produce an annotated document, presentation or report that highlights the importance of the review document and effective feedback in improving employee performance.

Indicative resource materials

Textbooks

Boyce A, Clarke S, Darbyshire A, Mantovani B and Weatherill B – *BTEC Level 2 First Engineering Student Book* (Pearson, 2010) ISBN 9781846907234

Boyce A, Clarke S, Darbyshire A, Mantovani B and Weatherill B – *BTEC Level 2 First Engineering Teaching Resource Pack* (Pearson, 2010) ISBN 9781846907258

Unit 4: Working Relationships in Manufacturing Engineering

Unit reference number: T/503/4701

Level: 2

Credit value: 2

Guided learning hours: 10

Unit aim

This unit gives learners the knowledge and understanding to develop effective working relationships within teams and the manufacturing engineering workplace in order to promote productive working relationships. It also introduces learners to key legislation covering discrimination in the manufacturing engineering workplace.

Working effectively in organisations is an essential part of a productive workplace. Having a positive working attitude and developing good working relationships important in order to support teamwork and avoid discriminatory behaviour and attitudes. Team leaders often have a responsibility to ensure teams are working effectively and efficiently and that team members are not being discriminated against and have a positive and cooperative approach.

In order to be effective and efficient in the manufacturing engineering workplace it is important to be able to demonstrate the ability to create and maintain effective working relationships with colleagues and supervisors. Good teamwork, a positive working attitude and effective working relationships can happen accidentally however, there are specific techniques and methodologies that allow these characteristics to develop within organisations. Good communication, shared responsibilities, supportive team leaders and managers all contribute to developing working relationships. This leads to a productive workplace and improvements in performance for the whole organisation.

Manufacturing engineering workplaces should be free from harassment and discrimination. By understanding what constitutes discrimination and the legislation that exists to protect the rights of workers and individuals, teams can further develop more positive working relationships and improve their team working.

Essential resources

Opportunities to visit the workplace or the provision of work placements would greatly assist in the delivery of this unit. Learners will also need access to relevant information and communication technology resources (including the internet).

Learning outcomes, assessment criteria and unit amplification

To pass 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.

Learning outcomes		Assessment criteria		Unit amplification
1	Know the importance of a positive attitude in manufacturing engineering workplaces	1.1	identify the factors that contribute to a positive working attitude	<ul style="list-style-type: none"> □ <i>Factors that contribute to a positive working attitude:</i> taking responsibility e.g. use of PPE, timekeeping, personal appearance, obtaining information; role models e.g. experienced colleagues, team leaders, mentors; rewards e.g. performance-related bonuses, employee of the month, shares schemes; workload e.g. sufficiently challenging, not underutilised or overstretched; accountability e.g. sharing of targets, performance review, appraisal, personal development; environment e.g. working safely, workspace organisation, climate control, lighting □ <i>Importance of a positive working attitude:</i> morale e.g. effect on colleagues, collaboration, keeping a positive outlook; relationship with customers, clients and other stakeholders; productivity
		1.2	describe the importance of having a positive working attitude in a manufacturing engineering workplace	
2	Know the factors that contribute to effective working relationships in manufacturing engineering workplaces	2.1	identify the factors that contribute to effective working relationships in manufacturing engineering workplaces	<ul style="list-style-type: none"> □ <i>Factors:</i> professionalism; seeking and offering help e.g. asking for information, not disrupting own or others work, show willing in helping others, referring requests to the appropriate people if necessary; respect e.g. respecting people's views, rights and property, being polite; dealing with issues e.g. identifying and dealing with problems in working relationships, ensure actions taken are within responsibility/ authority, resolving disagreements □ <i>Effective working relationship:</i> maintaining professional behaviour e.g. being polite, maintaining a professional attitude, responding to requests; good communication e.g. obtaining information from colleagues, keeping colleagues updated, meeting deadlines; understanding organisational requirements e.g. protocols, codes of behaviour; balancing workload e.g. mentoring new colleagues, maintaining own workload, helping colleagues
		2.2	describe effective working relationships in manufacturing engineering workplaces	

Learning outcomes		Assessment criteria		Unit amplification
3	Understand effective team working in manufacturing engineering workplaces	3.1	identify the factors that contribute to effective team working in manufacturing engineering workplaces	<ul style="list-style-type: none"> □ <i>Factors that contribute to effective team working:</i> communication with team e.g. keeping people informed, record of actions required, sharing information; managing and agreeing roles and responsibilities e.g. leadership, sharing the workload, job description, target setting; awards e.g. team awards, sharing in the success of individuals; building trust e.g. being able to rely on colleagues, sharing common goals; improved job satisfaction; planning techniques. □ <i>Implementing effective team working:</i> team building e.g. group work, team activities, social events, charity events; Shared projects e.g. reorganising workspaces, designing production layouts; development e.g. training programmes, support, case studies; setting goals e.g. shared targets, purpose of team, approach to team work; knowledge/skills transfer e.g. communication, priorities, strengths and weaknesses
		3.2	explain how to implement effective team working in manufacturing engineering workplaces	
4	Know the legal responsibilities to avoid discrimination in manufacturing engineering workplaces	4.1	identify the legislation covering discrimination in manufacturing engineering workplaces	<ul style="list-style-type: none"> □ <i>Legislation:</i> Equality Act 2010; Disability Discrimination Act 2005; Equal Pay Act 1970; Race Relations Act 1976; Sex Discrimination Act 1975; other related legislation e.g. European Convention on Human Rights 2000, EU directives, UN charter, company regulations

Information for tutors

Delivery

This unit could be delivered through a combination of work placements and/or visits. These can be supported by practical activities, tutor-led discussions, whole-class teaching and group/individual activities. During delivery of the unit centres must ensure that sufficient coverage of the learning outcomes and content takes place. Examples are given in the content to allow centres to determine the range of areas that might be covered. These examples are not exhaustive and centres may use these or their own to amplify and contextualise the unit content appropriately.

Work placements allow the learning outcomes to be considered in a real working environment where the majority of the assessment criteria could be evidenced. Alternatively, visits to local manufacturing engineering enterprises could be used. Learners can begin to investigate the importance of working relationships in manufacturing engineering workplaces. Pre-prepared questions could be used and tutors could help learners to devise a selection of appropriate questions focusing on this purpose.

Much of the unit can be delivered through practical activities and group work. Learners should engage in team activities that allow them to demonstrate teamwork skills and work together effectively showing a positive working attitude.

Research activities could be used to allow learners to identify factors that contribute to a positive working attitude and to allow learners to understand the range of legislation covering discrimination in the workplace. Policies issued by schools, colleges or local employers could be considered in addition to national and international legislation. This could be well supported by case studies that demonstrate different areas of discrimination and whether or not these break the law. Role-play activities could be used to learners to deal with disagreements in an amicable and positive way. Issues with working relationships could be introduced, with learners developing strategies in order to resolve these issues or escalate them as necessary.

Problem-solving activities, with learners working in groups, emphasise the need for effective teamwork. Learners could then reflect on the factors that promote good teamwork and consider the methods that can be employed. Activities should be linked to engineering manufacture to maintain the vocational context however, they will need to be sufficiently wide ranging in order to allow the full scope outlined in the unit content to be addressed. Throughout these activities learners should be considering their legal responsibilities and the responsibilities of organisations in terms of avoiding discrimination and discriminatory behaviour.

Note that the use of 'e.g.' in the content is to give an indication and illustration of the breadth and depth of the area or topic. As such, not all content that follows an 'e.g.' needs to be taught or assessed.

Assessment

Assessment of this unit could be contextualised using work placements or workplace visits. To pass this unit learners should provide evidence which satisfies all of the listed pass criteria. Although this can be achieved using a portfolio-based approach, it might be better facilitated using a mix of presentations and assignments.

Assessment criteria 1.1 and 1.2 could be evidenced using learner presentations. These could be based on a work placement or visit, with presentation slides identifying the factors that contribute to a positive working attitude. So that learners describe the importance of having a positive working attitude, a series of questions could be used, based on the presentations. Video evidence or tutor observation records could be used to ensure that the range of factors listed in the unit content adequately covered. If centres use group presentations it is important to ensure that all group members are given the opportunity to provide sufficient, reliable evidence.

Assessment criteria 2.1, 2.2, 3.1 and 3.2 could be combined with learners completing a review of the factors that contribute to effective team working and effective working relationships. This could be based on a work placement or workplace visit, although additional factors identified during team-building exercises and group work could also be included. A checklist or tabular approach could be taken which, provided the range in the unit content is covered, could satisfy 2.1 and 3.1. This evidence could be used to generate a written report that allows learners to describe effective working relationships and explain how to implement effective team working in manufacturing engineering workplaces.

Assessment criterion 4.1 could be assessed using a range of case studies; this range should be limited to only those that ensure that the legislation required can be evidenced. Learners could be tasked with producing a table or checklist that indicates the legislation required for each case study along with appropriate descriptions of the reason why this legislation might apply. Each case study could have a specific breach of the required legislation that demonstrates discrimination is taking place.

Textbooks

Boyce A, Clarke S, Darbyshire A, Mantovani B and Weatherill B – *BTEC Level 2 First Engineering Student Book* (Pearson, 2010) ISBN 9781846907234

Boyce A, Clarke S, Darbyshire A, Mantovani B and Weatherill B – *BTEC Level 2 First Engineering Teaching Resource Pack* (Pearson, 2010) ISBN 9781846907258

Unit 5: Understanding Employment Responsibilities and Rights

Unit reference number: D/602/4769

Level: 2

Credit value: 3

Guided learning hours: 30

Unit aim

This unit supports learning of employment rights and responsibilities across all occupations and sectors but with a specific focus on their application to manufacturing engineering workplaces.

Being aware of and conversant with the rules, principles and regulations governing employment rights and responsibilities is important to ensure that learners understand the conditions under which they work. This understanding protects both the employee and the employer, ensuring that work practice is undertaken in a mutually respectful and safe environment.

Employment rights and responsibilities start with the contract of employment, job description and procedures and policies within the workplace. All employees should know their statutory rights, their responsibilities, and the responsibility of the employer. These principles are enshrined within employment law and this unit introduces learners to laws and legislation that protect both employers and employees.

Learners will develop an understanding of their role as employees and the purpose of representative bodies such as trade unions and professional bodies. They will also explore wider issues. Manufacturing engineering businesses can be involved in emotive activities and work in specific environments that can arouse concern among the public and this unit explores how different viewpoints influence the way businesses operate.

Manufacturing engineering has a wide range of career pathways in different industry sectors and learners will develop an understanding of the various career pathways, occupational opportunities and what information can be used to allow them to develop their own careers.

Essential resources

Work placements should be used to allow learners to put the learning outcomes of this unit in context. Alternatively, workplace visit and exemplar workplace documentation, policies and procedures may be used. Access to careers advisers and learning resources, including the internet, essential to allow learners to evidence the full range and content of this unit.

Learning outcomes, assessment criteria and unit amplification

To pass 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.

Learning outcomes		Assessment criteria		Unit amplification
1	Know the statutory rights and responsibilities of employees and employers within own area of work	1.1	outline employee rights and responsibilities under Employment Law	<ul style="list-style-type: none"> □ <i>Employee rights and responsibilities</i>: difference between rights and responsibilities; current employment legislation; current anti-discrimination legislation e.g. gender, race, religion/belief, disability, age; working hours and holiday entitlement; European Working Time Directive (EWTD) □ <i>Employer rights and responsibilities</i>: duty of care to employees e.g. safe and healthy workplace, public liability insurance; Workplace Regulations (WHSWR) 1992; provision of appropriate training and development; disciplinary and dismissal rules □ <i>Sources and types of information on employment issues</i>: Human Resources (HR) department; line manager; trade union representative; professional body e.g. Engineering Employers Federation (EEF), Institution of Engineering Technicians (IET), Institution of Mechanical Engineers (IMechE), Society of Manufacturing Engineers (SME); DirectGov website; trade magazines and journals e.g. <i>Manufacturing Engineering</i>, <i>The Engineer</i>
		1.2	describe how related legislation can support employees in the workplace	
		1.3	describe employer responsibilities in the workplace	
		1.4	identify sources and types of information and advice on own employment rights and responsibilities	

Learning outcomes		Assessment criteria		Unit amplification
2	Understand agreed ways of working that protect own relationship with employer	2.1	explain the terms and conditions of own contract of employment	<ul style="list-style-type: none"> □ <i>Employee rights and responsibilities</i>: difference between rights and responsibilities; current employment legislation; current anti-discrimination legislation e.g. gender, race, religion/belief, disability, age; working hours and holiday entitlement; European Working Time Directive (EWTD)
		2.2	describe information shown on own pay statement	
		2.3	explain the procedures to follow in event of a grievance	<ul style="list-style-type: none"> □ <i>Employer rights and responsibilities</i>: duty of care to employees e.g. safe and healthy workplace, public liability insurance; Workplace Regulations (WHSWR) 1992; provision of appropriate training and development; disciplinary and dismissal rules □ <i>Sources and types of information on employment issues</i>: Human Resources (HR) department; line manager; trade union representative; professional body e.g. Engineering Employers Federation (EEF), Institution of Engineering Technicians (IET), Institution of Mechanical Engineers (IMechE), Society of Manufacturing Engineers (SME); DirectGov website; trade magazines and journals e.g. <i>Manufacturing Engineering</i>, <i>The Engineer</i>
		2.4	identify the personal information that must be kept up to date with own employer	
		2.5	explain agreed ways of working with employer	

Learning outcomes		Assessment criteria		Unit amplification
3	Know how own role fits within the wider context of the sector	3.1	describe the effect of own role on service provision	<ul style="list-style-type: none"> □ <i>Own role in the workplace</i>: own job description; organisation's aim; role of the sector; aims and objectives of the manufacturing engineering sector □ <i>Main roles and responsibilities of representative bodies</i>: trade unions; professional bodies; Health and Safety Executive (HSE); Science, Engineering and Manufacturing Technologies Alliance (SEMTA) □ <i>Issues of public concern</i>: consider the effect of recent high-profile events on the industry e.g. Hatfield rail disaster, BP oil spillage, Toyota Prius brake problems, opposition to the construction of wind farms and nuclear power stations, effects of global warming, toxic chemical leaks, oil tankers running aground causing oil leaks □ <i>Effects of public concern</i>: introduction of legislation and good practice e.g. Criminal Record Bureau checks, risk assessment; health and safety Legislation; disabilities and effects on building regulations; environmental legislation e.g. Kyoto agreement, Copenhagen accord; planning issues e.g. planning application process, effects on wildlife and endangered species, environmental impact, noise pollution; issues for manufacturers e.g. adverse publicity, brand loyalty, customer confidence
		3.2	describe how own role links to the wider sector	
		3.3	describe the main roles and responsibilities of representative bodies that influence the wider sector	
		3.4	outline different viewpoints around an issue of public concern relevant to the sector or occupation	
		3.5	describe how issues of public concern have altered public views of the sector or occupation	

Learning outcomes		Assessment criteria		Unit amplification
4	Know career pathways available within own and related sectors	4.1	describe occupational opportunities within own sector and related sectors	<ul style="list-style-type: none"> □ <i>Career pathways</i>: progression routes within manufacturing engineering e.g. craft/technician apprenticeship frameworks, NVQs, technical certificates, higher apprenticeships, graduate opportunities; importance of continuing professional development (CPD) e.g. in-house training, local HE/FE provision, distance-learning options □ <i>Sources of information</i>: line manager; Sector Skills Council for Science, Engineering and Manufacturing Technologies (SEMTEA); Job Centres; relevant web sites e.g. DirectGov (next step), SEMTEA (careers), local FE college □ <i>Developing own career path</i>: create a development plan e.g. aspirations, training needs, ongoing education, timescale and milestones, mentor guidance, review and adapt
		4.2	identify sources of information related to a chosen career pathway	
		4.3	identify next steps in own career pathway	

Information for tutors

Delivery

This unit investigates topics that apply generally, and others which apply specifically to the manufacturing engineering workplace. Input should be as varied as possible, making good use of internet resources and websites, together with group work, individual study and team activities as well as more traditional written tasks. Learners should be encouraged to read around the subject to gain more understanding of the content of the relevant legislation. Where learners are employed or on work placement, evidence can be obtained from the workplace. This could be facilitated using self-study guides with appropriate tutor support.

Visiting speakers, who work in various parts of the sector or who work for associated organisations, would greatly enliven the programme. Similarly, workplace visits to local manufacturing engineering enterprises will allow learners to investigate the importance of employment rights and responsibilities by asking pre prepared questions. Tutors could help learners to devise a selection of appropriate questions focusing on this purpose. All study should be related to the workplace.

Throughout the delivery of this unit learners should be focusing on their own employment (actual or by use of a case study). They should be considering their rights and responsibilities under employment law and how legislation will affect them in the workplace. Examples of contracts of employment could be used to develop an understanding of terms and conditions, with exemplar pay slips and grievance procedures being used to show learners what information is typically contained therein.

The use of case studies to put manufacturing engineering in context will allow learners to appreciate public concerns and issues from different perspectives. Group role-play activities could allow learners to link their role within an organisation to the wider engineering sector and understand the part played by representative bodies.

Using appropriate employer representatives, careers advisory services and resources, developed by SEMTA and educational awarding bodies, could help to guide learners towards an understanding of the career pathways available to them in manufacturing engineering. With assistance, learners should be encouraged to develop career pathways and development plans for themselves.

The delivery of this unit can be linked to *Unit 4: Working Relationships in Manufacturing Engineering*.

Note that the use of 'e.g.' in the content is to give an indication and illustration of the breadth and depth of the topic area. As such, not all content that follows an 'e.g.' needs to be taught or assessed.

Assessment

Naturally occurring evidence should be used where possible. It is likely that learners will undertake an induction process for any work role or work placement. Learners could build a portfolio of evidence or workbook that, as well as showing evidence of achievement, could be used as a point of reference for their future work.

Assessment criteria could be evidenced through a series of assignments, designed to match the assessment criteria and cover the range outlined in the unit content. This unit is ideally suited to being delivered in the workplace and learners could undertake work placements and gather evidence by completing appropriate study guides while on their placements. They may need to gather supplementary evidence after suitable work placements have been completed and tutors should ensure that evidence collated by learners matches the requirements of the range outlined in the unit content.

Where limited access to the workplace or work placements exists, learners could research key elements of employment law, including statutory rights and responsibilities. This research could be used to answer given questions that address the range required in the unit content. Examples of contracts of employment, pay statements, typical workplace procedures and grievance policies could be supplied to learners in order for them to evidence learning outcome 2.

These could be supported by research on personal information held by employers and data protection.

Learners could research career pathways, with access to careers advice and sources of appropriate information, allowing them to develop personal development plans that evidence the requirements of learning outcome 4.

Textbooks

Boyce A, Clarke S, Darbyshire A, Mantovani B and Weatherill B – *BTEC Level 2 First Engineering Student Book* (Pearson, 2010) ISBN 978-1846907234

Boyce A, Clarke S, Darbyshire A, Mantovani B and Weatherill B – *BTEC Level 2 First Engineering Teaching Resource Pack* (Pearson, 2010) ISBN 978-1846907258

Mitchell Sack S – *The Employee Rights Handbook* (Warner Books, 2000)
ISBN 978-0446673266

Mitchell Sack S – *The Employee Rights Handbook: Effective Legal Strategies to Protect Your Job from Interview to Pink Slip* (Legal Strategies Inc, 2010)
ISBN 978-0963630674

12 Further information and useful publications

To get in touch with us visit our 'Contact us' pages:

- Edexcel, BTEC and Pearson Work Based Learning contact details: qualifications.pearson.com/en/support/contact-us.html
- books, software and online resources for UK schools and colleges: www.pearsonschoolsandfecolleges.co.uk

Key publications:

- *Adjustments for candidates with disabilities and learning difficulties, Access and Arrangements and Reasonable Adjustments, General and Vocational qualifications* (Joint Council for Qualifications (JCQ))
- *Supplementary guidance for reasonable adjustments and special consideration in vocational internally assessed units* (Pearson)
- *General and Vocational qualifications, Suspected Malpractice in Examination and Assessments: Policies and Procedures* (JCQ)
- *Equality Policy* (Pearson)
- *Recognition of Prior Learning Policy and Process* (Pearson)
- *UK Information Manual* (Pearson)
- *BTEC UK Quality Assurance Centre Handbook*

All of these publications are available on our website.

Publications on the quality assurance of BTEC qualifications are also available on our website.

Our publications catalogue lists all the material available to support our qualifications. To access the catalogue and order publications, please visit our website.

Additional resources

If you need further learning and teaching materials to support planning and delivery for your learners, there is a wide range of BTEC resources available.

Any publisher can seek endorsement for their resources and, if they are successful, we will list their BTEC resources on our website.

13 Professional development and training

Pearson supports UK and international customers with training related to BTEC qualifications. This support is available through a choice of training options offered on our website.

The support we offer focuses on a range of issues, such as:

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

The national programme of training we offer is on our website. You can request centre-based training through the website or you can contact one of our advisers in the Training from Pearson UK team via Customer Services to discuss your training needs.

BTEC training and support for the lifetime of the qualifications

Training and networks: our training programme ranges from free introductory events through sector-specific opportunities to detailed training on all aspects of delivery, assignments and assessment. We also host some regional network events to allow you to share your experiences, ideas and best practice with other BTEC colleagues in your region.

Regional support: our team of Curriculum Development Managers and Curriculum Support Consultants, based around the country, are responsible for providing advice and support in centres. They can help you with planning and curriculum developments.

To get in touch with our dedicated support teams please visit our website.

Your Pearson support team

Whether you want to talk to a sector specialist, browse online or submit your query for an individual response, there's someone in our Pearson support team to help you whenever – and however – you need:

- **Subject Advisors:** find out more about our subject advisor team – immediate, reliable support from a fellow subject expert
- **Ask the Expert:** submit your question online to our Ask the Expert online service and we will make sure your query is handled by a subject specialist.

Please visit our website at qualifications.pearson.com/en/support/contact-us.html

Annexe A

Progression opportunities

These are examples of progression opportunities to other Pearson qualifications within the Manufacturing Engineering sector.

Level	General qualifications (GCSEs, GCEs)	BTEC Firsts/Nationals/Higher Nationals	BTEC Specialist/Professional qualifications	NVQ/competence-based qualifications
5		Pearson BTEC Level 5 HND Diploma in Manufacturing Engineering Pearson BTEC Level 5 HND Diploma in Mechanical Engineering Pearson BTEC Level 5 HND Diploma in Operations Engineering Pearson BTEC Level 5 HND Diploma in Electrical/Electronic Engineering Pearson BTEC Level 5 HND Diploma in General Engineering Pearson BTEC Level 5 HND Diploma in Automotive Engineering Pearson BTEC Level 5 HND Diploma in Aeronautical Engineering		

Level	General qualifications (GCSEs, GCEs)	BTEC Firsts/Nationals/Higher Nationals	BTEC Specialist/Professional qualifications	NVQ/competence-based qualifications
4		Pearson BTEC Level 4 HNC Diploma in Manufacturing Engineering Pearson BTEC Level 4 HNC Diploma in Mechanical Engineering Pearson BTEC Level 4 HNC Diploma in Operations Engineering Pearson BTEC Level 4 HNC Diploma in Electrical/Electronic Engineering Pearson BTEC Level 4 HNC Diploma in General Engineering Pearson BTEC Level 4 HNC Diploma in Automotive Engineering Pearson BTEC Level 4 HNC Diploma in Aeronautical Engineering		

Level	General qualifications (GCSEs, GCEs)	BTEC Firsts/Nationals/Higher Nationals	BTEC Specialist/Professional qualifications	NVQ/competence-based qualifications
3		<p>Pearson BTEC Level 3 Certificate, Subsidiary Diploma, Diploma and Extended Diploma in Engineering</p> <p>Pearson BTEC Level 3 Diploma and Extended Diploma in Mechanical Engineering</p> <p>Pearson BTEC Level 3 Diploma and Extended Diploma in Manufacturing Engineering</p> <p>Pearson BTEC Level 3 Diploma and Extended Diploma in Operations and Maintenance Engineering</p> <p>Pearson BTEC Level 3 Diploma and Extended Diploma in Electrical/Electronic Engineering</p> <p>Pearson BTEC Level 3 Diploma and Extended Diploma in Aeronautical Engineering</p>		
2	<p>GCSE Engineering</p> <p>GCSE Manufacturing</p>	Pearson BTEC Level 2 Certificate, Extended Certificate and Diploma in Engineering		
1		Pearson BTEC Level 1 Award, Certificate and Diploma in Engineering		

Annexe B

Mapping with National Occupational Standards

The grid below maps the knowledge covered in the Pearson BTEC Level 2 Certificate in Improving Performance in Manufacturing Engineering Operations against the underpinning knowledge of the National Occupational Standards in Improving Performance in Manufacturing Engineering Operations. Centres can use this mapping when planning holistic delivery and assessment activities.

KEY

indicates partial coverage of knowledge in the NOS unit

A blank space indicates no coverage of the knowledge

NOS		BTEC Specialist units				
		Unit 1	Unit 2	Unit 3	Unit 4	Unit 5
	Using and Interpreting Engineering Data and Documentation		#	#		
	Using and Communicating Technical Information		#	#		

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