

Edexcel BTEC Level 1 Award/Certificate/Diploma in Engineering (QCF)

Specification

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Issue 2

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Purpose of this specification

The purpose of a specification as defined by Ofqual is to set 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 that 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

For more than 25 years, BTECs have earned their reputation as well-established, enduringly effective qualifications. They have a proven track record of improving motivation and achievement. BTECs also provide progression routes to the next stage of education or to employment.

What are BTEC Specialist qualifications?

BTEC Specialist qualifications are qualifications from Entry to level 3 on the Qualifications and Credit Framework (QCF). They are work-related qualifications and are available in a range of sectors. They give learners the knowledge, understanding and skills they need to prepare for employment. They also provide career development opportunities for those already in work. These qualifications may be full time or part time courses in schools or colleges. Training centres and employers may also offer these qualifications.

Some BTEC Specialist qualifications are knowledge components in Apprenticeship Frameworks ie Technical Certificates.

There are three sizes of BTEC specialist qualification in the QCF:

- Award (1 to 12 credits)
- Certificate (13 to 36 credits)
- Diploma (37 credits and above).

Every unit and qualification in the QCF has a credit value.

The credit value of a unit is based on:

- one credit for every 10 hours of learning time
- learning time – defined as the time taken by learners at the level of the unit, on average, to complete the learning outcomes to the standard determined by the assessment criteria.

2 Qualification summary and key information

Qualification title	Edexcel BTEC Level 1 Award in Engineering (QCF)
QCF Qualification Number (QN)	500/8859/2
Qualification framework	Qualifications and Credit Framework (QCF)
Date registrations can be made	1 st September 2010
Age range that the qualification is approved for	14-16 16-18 19+
Credit value	7
Assessment	Centre-devised assessment (internal assessment)
Guided learning hours	70-90
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 Edexcel Access and Recruitment policy (see Section 10, Access and recruitment)

Qualification title	Edexcel BTEC Level 1 Certificate in Engineering (QCF)
QCF Qualification Number (QN)	501/0305/2
Qualification framework	Qualifications and Credit Framework (QCF)
Date registrations can be made	1 st September 2010
Age range that the qualification is approved for	14-16 16-18 19+
Credit value	13
Assessment	Centre-devised assessment (internal assessment)
Guided learning hours	130-150
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 Edexcel Access and Recruitment policy (see Section 10, Access and recruitment)

Qualification title	Edexcel BTEC Level 1 Diploma in Engineering (QCF)
QCF Qualification Number (QN)	500/9859/7
Qualification framework	Qualifications and Credit Framework (QCF)
Date registrations can be made	1 st September 2010
Age range that the qualification is approved for	14-16 16-18 19+
Credit value	37
Assessment	Centre-devised assessment (internal assessment)
Guided learning hours	330-370
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 Edexcel Access and Recruitment policy (see Section 10, Access and recruitment)

QCF qualification title and Qualification Number

Centres will need to use the QCF Qualification Number (QN) when they seek public funding for their learners. As well as a QN, each unit within a qualification has a QCF unit reference number (URN).

The qualification title, units and QN will appear on each learner's final certificate. You should tell your learners this when your centre recruits them and registers them with us. Further information about certification is in the *Edexcel Information Manual* on our website at www.edexcel.com

Objective of the qualifications

The Edexcel BTEC Level 1 Award, Certificate and Diploma in Engineering (QCF) have been developed to give learners the opportunity to:

- engage in learning which is relevant to them and will provide opportunities to develop a range of skills and techniques, personal skills and attributes essential for successful performance in working life
- achieve a nationally recognised Level 1 vocationally related qualification
- progress to employment in a particular vocational sector
- progress to related general and/or vocational qualifications.

Edexcel BTEC Level 1 Award (QCF) (7 credits)

The 7-credit Edexcel BTEC Level 1 Award (QCF) provides an introduction to the skills, qualities and knowledge that may be required for employment in a particular vocational sector.

Edexcel BTEC Level 1 Certificate (QCF) (13 credits)

The 13-credit Edexcel BTEC Level 1 Certificate (QCF) extends the work-related focus from the Edexcel BTEC Level 1 Award (QCF) and covers some of the knowledge and practical skills required for a particular vocational sector.

The Edexcel BTEC Level 1 Certificate (QCF) offers an engaging programme for those who are clear about the vocational area that they wish to learn more about. These learners may wish to extend their programme through the study of a related GCSE, a complementary NVQ or other related vocational or personal and social development qualification. These learning programmes can be developed to allow learners to study complementary qualifications without duplication of content.

For adult learners the Edexcel BTEC Level 1 Certificate (QCF) can extend their knowledge and understanding of work in a particular sector. It is a suitable qualification for those wishing to change career or move into a particular area of employment following a career break.

Edexcel BTEC Level 1 Diploma (QCF) (37 credits)

The 37-credit Edexcel BTEC Level 1 Diploma (QCF) extends the work-related focus from the Edexcel BTEC Level 1 Certificate (QCF). There is potential for the qualification to prepare learners for employment in a particular vocational sector and it is suitable for those who have decided that they wish to enter a specific area of work.

Progression opportunities through Edexcel qualifications

The intended destinations for learners successfully achieving these qualifications include:

- GCSEs and/or A Levels
- Diplomas
- apprenticeships
- supported employment
- independent living.

Industry support and recognition

These qualifications are supported by the SSB and the SSC.

Relationship with National Occupational Standards

These qualifications relate to the National Occupational Standards in Level 1 Performing Engineering Operations. The mapping document in *Annexe A* 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 qualifications.
- 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 qualifications.
- 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

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

Unit

Unit 1: Working Safely in Engineering

Resources required

Learners will need access to workshops and other facilities to consider health and safety issues.

A range of health and safety policies and procedures from local companies.

A range of legislation and health and safety regulations including:

- Health and Safety at Work etc Act 1974
- Management of Health and Safety at Work Regulations 1999
- Provision and Use of Work Equipment Regulations (PUWER) 1998
- Control of Substances Hazardous to Health (COSHH) Regulations 2002
- Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (RIDDOR) 1995

Unit

Resources required

Videos/DVDs

- *957 Safety and the Human Factor*
- *966 Safety Awareness*
- *994 Personal Protective Equipment*
- *999 Manual Handling*
- *1005 Electrical Safety in the Workplace*
- *Risk Assessment*
- *Dealing with Chemical Safety*
- *Noise and Hearing Conservation*
- *COSHH.*

All available from:

Safetycare (UK) Ltd
1st Floor Greencoat House
183 Clarence Street
Kingston upon Thames
Surrey
KT1 1QT

Unit 2: Developing Skills in Making Engineering Components Using Hand Tools

It would be extremely useful if learners had access to a range of tools and equipment commonly used in engineering. It may be possible to arrange a visit to an engineering company to extend learners awareness of the range of resources used in engineering.

A typical centre engineering workshop should be equipped with the basic requirements of this unit. Including marking out equipment, hand tools, measuring equipment and benches. All supporting auxiliary equipment should also be available together with appropriate safety equipment.

Workshops should be staffed appropriately to ensure health and safety requirements are met. Technician support may be required during practical work.

Unit

Unit 3: Developing Skills in Using a Bench/Pedestal Drilling Machine

Resources required

In this unit learners will be introduced to the practical skills needed to carry out drilling operations using a bench or pedestal drilling machine. They will explore the need to understand what they are going to carry out and prepare the machine, tools and holding devices correctly. Learners will then drill holes to given specifications and check for size and positional accuracy using rules, calipers and other measuring equipment which they have selected.

Learners will consider the importance of working safely with powered machinery and the need to check that guards, isolation switches, tools and equipment are in a safe and useable condition at all times. They will also appreciate that before they start to drill a component they must check that it is suitable for holding down and is made from the correct material.

This unit helps learners to appreciate the importance of following given instructions when carrying out activities and recognise what might go wrong when drilling holes in basic engineering components.

Unit 4: Developing Skills in Planning and Making a Machined Product

It would be extremely useful if learners had access to a range of equipment commonly used in engineering. It may be possible to arrange a visit to an engineering company to extend learner awareness of the range of resources used in engineering.

A typical centre engineering workshop should be equipped with the basic requirements of this unit including a range of grinding machines, milling machines and turning machines. All supporting auxiliary equipment should also be available together with appropriate safety equipment.

Workshops should be staffed appropriately to ensure health and safety requirements are met. Technician support may be required during practical work.

Unit

Unit 5: Developing Skills in Assembling Mechanical Components

Resources required

It would be extremely useful if learners had access to a range of equipment commonly used in engineering. It may be possible to arrange a visit to an engineering company to extend learner awareness of the range of resources used in engineering.

A typical centre engineering workshop should be equipped with the basic requirements of this unit including a range of mechanical fastening devices, tools and equipment for assembly operations. All supporting auxiliary equipment should also be available together with appropriate safety equipment.

Workshops should be staffed appropriately to ensure health and safety requirements are met. Technician support may be required during practical work.

Unit 6: Developing Skills in Joining Materials Using Welding

It would be extremely useful if learners had access to a range of equipment commonly used in engineering. It may be possible to arrange a visit to an engineering company to extend learner awareness of the range of resources used in engineering.

A typical centre engineering workshop should be equipped with the basic requirements of this unit including a range of welding process equipment, for example oxy fuel-gas, manual metal arc, gas-shielded arc. All supporting auxiliary equipment should also be available together with appropriate safety equipment.

Workshops should be staffed appropriately to ensure health and safety requirements are met. Technician support may be required during practical work.

Unit 7: Developing Skills in Electronic Assembly

A typical centre engineering workshop should be equipped with the basic requirements of this unit including a range of electronic assembly equipment and components, tools and equipment for assembly operations. All supporting auxiliary equipment should also be available together with appropriate safety equipment.

Workshops should be staffed appropriately to ensure health and safety requirements are met. Technician support may be required during practical work.

Unit

Resources required

Unit 8: Developing Skills in Wiring Electrical Circuits and Components

A typical centre engineering workshop should be equipped with the basic requirements of this unit including a range of electrical wiring equipment and components, cables, tools and equipment for assembly operations. All supporting auxiliary equipment should also be available together with appropriate safety equipment.

Workshops should be staffed appropriately to ensure health and safety requirements are met. Technician support may be required during practical work.

Unit 9: Developing Skills in Routine Servicing of Mechanical Equipment

A typical centre engineering workshop should be equipped with the basic requirements of this unit including a range of mechanical systems or equipment and components, tools and equipment for servicing operations. All supporting auxiliary equipment should also be available together with appropriate safety equipment.

Workshops should be staffed appropriately to ensure health and safety requirements are met. Technician support may be required during practical work.

Unit 10: Developing Skills in Routine Servicing of an Electrical/Electronic System

A typical centres engineering workshop should be equipped with the basic requirements of this unit including a range of electrical/electronic systems or equipment and component, tools and equipment for servicing operations. All supporting auxiliary equipment should also be available together with appropriate safety equipment.

Workshops should be staffed appropriately to ensure health and safety requirements are met. Technician support may be required during practical work.

Unit 11: Starting Work in Engineering

People working in the engineering sector are likely to be a very useful resource to motivate and inspire learners. Centres are encouraged to invite external speakers to talk about their experiences of companies and work. Paper-based information such as directories of organisations, job descriptions and job adverts from newspapers are all sources of useful information for learners.

Unit**Resources required**

Unit 12: Searching for a Job

Learners will need access to sources of information about where and how to search for specific types of jobs (such as magazines, newspapers, the internet, other people, Jobcentres). They will also need access to examples of relevant job advertisements (real or simulated).

Unit 13: Applying for a Job

Learners will need access to examples of real or simulated job application forms and examples of other job application documents such as CVs and covering letters.

Unit 14: Preparing for an Interview

In order to prepare for an interview, learners will need a given brief for an appropriate job, placement or place on a training course.

Unit 15: Interview Skills

Learners need the opportunity to participate in a real-life or simulated interview.

Unit 16: Positive Attitudes and Behaviours at Work

Copies of organisational procedures for different types of organisation as appropriate – for example centres procedures for staff and/or learners relating to conduct and behaviour (or if in the workplace, copies of workplace procedures).

Relevant training or developmental courses relating to good conduct (for example assertiveness, communication skills).

Copies of any appraisal systems which recognise good conduct/performance.

Unit 17: Working in a Team

Learners will need the opportunity to participate in a team-working task.

Unit 20: Interpreting and Using Engineering Information

Learners will need access to sources of information (eg drawings, charts, tables, manuals) as defined by the content section. Wherever possible, centres should ensure that this data is relevant to the learner's current or expected work-based experience. Centres will need to have their own drawing/document storage facilities as an example of a typical care and control process for drawings and related documentation.

Unit 21: Engineering Marking Out

Access to a fully equipped workshop with access to the range of measurement and marking out equipment identified in the unit content is essential. A range of workpiece materials, components and drawings will also be required to enable the learner to gain the range of experience and coverage expected.

4 Qualification structures

Edexcel BTEC Level 1 Award in Engineering (QCF)

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

At least 4 additional credits must be achieved by completing optional units, of which no more than 3 credits may be achieved from option group B.

Minimum number of credits that must be achieved	7
Number of mandatory credits that must be achieved	3
Number of optional credits that must be achieved	4

Unit	Unique Reference Number	Mandatory units	Level	Credit	Guided Learning Hours
1	T/600/9131	Working Safely in Engineering	1	3	30
Unit	Unique Reference Number	Optional units Group A	Level	Credit	Guided Learning Hours
2	D/600/9138	Developing Skills in Making Engineering Components Using Hand Tools	1	4	40
3	H/600/9139	Developing Skills in Using a Bench/Pedestal Drilling Machine	1	4	40
4	Y/600/9140	Developing Skills in Planning and Making a Machined Product	1	6	60
5	H/600/9142	Developing Skills in Assembling Mechanical Components	1	3	30
6	K/601/0096	Developing Skills in Joining Materials Using Welding	1	3	30
7	H/601/0095	Developing Skills in Electronic Assembly	1	3	30
8	L/601/0124	Developing Skills in Wiring Electrical Circuits and Components	1	3	30
9	R/601/0125	Developing Skills in Routine Servicing of Mechanical Equipment	1	3	30
10	D/601/0127	Developing Skills in Routine Servicing of an Electrical/Electronic System	1	3	30
11	L/503/3425	Starting Work in Engineering	1	4	40

Unit	Unique Reference Number	Optional units Group B	Level	Credit	Guided Learning Hours
12	L/501/5958	Searching for a Job	1	1	10
13	Y/501/5848	Applying for a Job	1	1	10
14	M/501/5824	Preparing for an Interview	1	1	10
15	R/501/5847	Interview Skills	1	1	10
16	A/501/5826	Positive Attitudes and Behaviours at Work	1	1	10
17	L/501/5832	Working in a Team	1	3	30
18	L/501/6382	Investigating Rights and Responsibilities at Work	1	1	10
19	F/501/5942	Planning an Enterprise Activity	1	1	10

Edexcel BTEC Level 1 Certificate in Engineering (QCF)

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

At least 10 additional credits must be achieved by completing optional units, of which no more than 3 credits may be achieved from option group B.

Minimum number of credits that must be achieved	13
Number of mandatory credits that must be achieved	3
Number of optional credits that must be achieved	10

Unit	Unique Reference Number	Mandatory units	Level	Credit	Guided Learning Hours
1	T/600/9131	Working Safely in Engineering	1	3	30
Unit	Unique Reference Number	Optional units Group A	Level	Credit	Guided Learning Hours
2	D/600/9138	Developing Skills in Making Engineering Components Using Hand Tools	1	4	40
3	H/600/9139	Developing Skills in Using a Bench/Pedestal Drilling Machine	1	4	40
4	Y/600/9140	Developing Skills in Planning and Making a Machined Product	1	6	60
5	H/600/9142	Developing Skills in Assembling Mechanical Components	1	3	30
6	K/601/0096	Developing Skills in Joining Materials Using Welding	1	3	30
7	H/601/0095	Developing Skills in Electronic Assembly	1	3	30
8	L/601/0124	Developing Skills in Wiring Electrical Circuits and Components	1	3	30
9	R/601/0125	Developing Skills in Routine Servicing of Mechanical Equipment	1	3	30
10	D/601/0127	Developing Skills in Routine Servicing of an Electrical/Electronic System	1	3	30
11	L/503/3425	Starting Work in Engineering	1	4	40

Unit	Unique Reference Number	Optional units Group B	Level	Credit	Guided Learning Hours
12	L/501/5958	Searching for a Job	1	1	10
13	Y/501/5848	Applying for a Job	1	1	10
14	M/501/5824	Preparing for an Interview	1	1	10
15	R/501/5847	Interview Skills	1	1	10
16	A/501/5826	Positive Attitudes and Behaviours at Work	1	1	10
17	L/501/5832	Working in a Team	1	3	30
18	L/501/6382	Investigating Rights and Responsibilities at Work	1	1	10
19	F/501/5942	Planning an Enterprise Activity	1	1	10

Edexcel BTEC Level 1 Diploma in Engineering (QCF)

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

At least 34 additional credits must be achieved by completing optional units, of which a minimum of 21 credits must be chosen group A, no more than 3 credits may be achieved from option group B and no more than 10 credits may be achieved from option group C.

Minimum number of credits that must be achieved	37
Minimum number of credits that must be achieved at level 1 or above	37
Number of mandatory credits that must be achieved	3
Number of optional credits that must be achieved	34

Unit	Unique Reference Number	Mandatory units	Level	Credit	Guided Learning Hours
1	T/600/9131	Working Safely in Engineering	1	3	30
Unit	Unique Reference Number	Optional units Group A	Level	Credit	Guided Learning Hours
2	D/600/9138	Developing Skills in Making Engineering Components Using Hand Tools	1	4	40
3	H/600/9139	Developing Skills in Using a Bench/Pedestal Drilling Machine	1	4	40
4	Y/600/9140	Developing Skills in Planning and Making a Machined Product	1	6	60
5	H/600/9142	Developing Skills in Assembling Mechanical Components	1	3	30
6	K/601/0096	Developing Skills in Joining Materials Using Welding	1	3	30
7	H/601/0095	Developing Skills in Electronic Assembly	1	3	30
8	L/601/0124	Developing Skills in Wiring Electrical Circuits and Components	1	3	30
9	R/601/0125	Developing Skills in Routine Servicing of Mechanical Equipment	1	3	30
10	D/601/0127	Developing Skills in Routine Servicing of an Electrical/Electronic System	1	3	30
11	L/503/3425	Starting Work in Engineering	1	4	40

Unit	Unique Reference Number	Optional units Group B	Level	Credit	Guided Learning Hours
12	L/501/5958	Searching for a Job	1	1	10
13	Y/501/5848	Applying for a Job	1	1	10
14	M/501/5824	Preparing for an Interview	1	1	10
15	R/501/5847	Interview Skills	1	1	10
16	A/501/5826	Positive Attitudes and Behaviours at Work	1	1	10
17	L/501/5832	Working in a Team	1	3	30
18	L/501/6382	Investigating Rights and Responsibilities at Work	1	1	10
19	F/501/5942	Planning an Enterprise Activity	1	1	10
Unit	Unique Reference Number	Optional units Group C	Level	Credit	Guided Learning Hours
20	T/600/0378	Interpreting and Using Engineering Information	2	5	30
21	J/600/0417	Engineering Marking Out	2	5	30

5 Assessment

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

Units	Assessment methods
All units	Centre-devised assessment

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 assessment criteria. 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 in *Information for tutors*, the centre can decide the form of assessment evidence (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.

To avoid over assessment centres are encouraged to link delivery and assessment across units.

There is more guidance about internal assessment on our website. See *Section 13*. Further information and useful publications.

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.

Edexcel 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 the policy document *Recognition of Prior Learning Policy*, which is on the Edexcel website.

Credit transfer

Credit transfer describes the process of using a credit or credits awarded in the context of a different qualification or awarded by a different awarding organisation towards the achievement requirements of another qualification. All awarding organisations recognise the credits awarded by all other awarding organisations that operate within the QCF.

If learners achieve units with other awarding organisations, they do not need to retake any assessment for the same units. The centre must keep evidence of unit achievement.

7 Centre recognition and approval

Centres that have not previously offered Edexcel qualifications need to apply for, and be granted, centre recognition as part of the process for approval to offer individual qualifications. New centres must complete an *Edexcel Vocational Centre & Qualification Approval Form (VCQA)*.

Existing centres get 'automatic approval' for a new qualification if they are already approved for a qualification that is being replaced by the new qualification and the conditions for automatic approval are met. Centres that already hold Edexcel Centre approval are able to apply for qualification approval for a different level or different sector via Edexcel Online, up to and including level 3 only.

In some circumstances, qualification approval using Edexcel Online may not be possible. In such cases, guidance is available as to how an approval application may be made.

Approvals agreement

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

8 Quality assurance of centres

Quality assurance is at the heart of vocational qualifications. The centre assesses Edexcel BTEC qualifications. The centre will use quality assurance to make sure that their managers, internal verifiers and assessors are standardised and supported. Edexcel 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 Edexcel 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 annually 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.

9 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.

Centres must make sure that any legislation is up to date and current.

10 Access and recruitment

Edexcel'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 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 Access to qualifications for learners with disabilities or specific needs

Equality and fairness are central to our work. Edexcel's Equality Policy requires all learners to have equal opportunity to access our qualifications and assessments. It also requires our qualifications to be awarded in a way that is fair to every learner.

We are committed to making sure that:

- learners with a protected characteristic (as defined by the Equality Act 2010) are not, when they are undertaking one of our qualifications, disadvantaged in comparison to learners who do not share that characteristic
- all learners achieve the recognition they deserve from undertaking a qualification and that this achievement can be compared fairly to the achievement of their peers.

Learners taking a qualification may be assessed in British sign language or Irish sign language where it is permitted for the purpose of reasonable adjustments.

Details on how to make adjustments for learners with protected characteristics are given in the policy documents *Application of Reasonable Adjustment for BTEC and Edexcel NVQ Qualifications* and *Application for Special Consideration: BTEC and Edexcel NVQ Qualifications*.

The documents are on our website at www.edexcel.com/policies

12 Units

Units have the following sections.

Unit title

The unit title is on the QCF and this form of words will appear on the learner's Notification of Performance (NOP).

Unit reference number

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

QCF level

All units and qualifications within the QCF have a level assigned to them. There are nine levels of achievement, from Entry to level 8. The QCF Level Descriptors inform the allocation of the level.

Credit value

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

Guided learning hours

Guided learning hours are the times when a tutor, trainer or facilitator is present to give specific guidance towards the learning aim for a programme. This definition covers lectures, tutorials and supervised study in for example open learning centres and learning workshops. It also includes assessment by staff where learners are present. It does not include time spent by staff marking assignments or homework where the learner is not present.

Unit aim

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

Essential resources

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

Learning outcomes

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

Assessment criteria specify the standard required by the learner to achieve each learning outcome.

Unit amplification

This section clarifies what a learner needs to know to achieve a learning outcome.

Information for tutors

This section gives tutors information on delivery and assessment. It 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: Working Safely in Engineering

Unit reference number: T/600/9131

QCF level: 1

Credit value: 3

Guided learning hours: 30

Unit aim

This unit is designed to introduce learners to health and safety issues in engineering. It will help them to be aware of the potential hazards they may be exposed to in engineering environments and cope with and reduce risks. This unit provides some of the knowledge, understanding and skills for the Level 1 Performing Engineering Operations NOS Unit 1: Working Safely in an Engineering Environment.

Unit introduction

This unit introduces learners to the health and safety issues associated with developing practical skills in an engineering environment.

Learners will carry out work activities in accordance with instructions and use safe working practices and procedures. They will cover the identification of hazardous situations, equipment, materials or conditions and how to take appropriate action to eliminate/minimise the risks to life, property and the environment within the immediate work surroundings. They will need to recognise the hazards in the engineering environment they work in, appreciate the level of risk involved with those hazards and the precautions they can take to lower the risk of injury or damage to plant and equipment.

Learners will need to demonstrate that they can take actions required in emergency situations such as accidents involving injury and the sounding of fire/evacuation alarms.

Essential resources

Learners will need access to workshops and other facilities to consider health and safety issues.

A range of health and safety policies and procedures from local companies.

A range of legislation and health and safety regulations including:

- Health and Safety at Work etc Act 1974
- Management of Health and Safety at Work Regulations 1999
- Provision and Use of Work Equipment Regulations (PUWER) 1998
- Control of Substances Hazardous to Health (COSHH) Regulations 2002

- Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (RIDDOR) 1995

Videos/DVDs

- *957 Safety and the Human Factor*
- *966 Safety Awareness*
- *994 Personal Protective Equipment*
- *999 Manual Handling*
- *1005 Electrical Safety in the Workplace*
- *COSHH.*
- *Dealing with Chemical Safety*
- *Noise and Hearing Conservation*
- *Risk Assessment*

All available from:

Safetycare (UK) Ltd
1st Floor Greencoat House
183 Clarence Street
Kingston upon Thames
Surrey
KT1 1QT

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 about statutory regulations and organisational requirements	1.1	<p>List three general regulations and two specific regulations that have a statutory requirement under relevant sections of the Health and Safety at Work Act 1974</p>	<p><i>Statutory regulations:</i> relevant sections of the Health and Safety at Work etc. Act 1974; general regulations eg Control of Substances Hazardous to Health 2002, Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 1995, Provision and Use of Work Equipment Regulations 1998, Management of Health and Safety Regulations 1999; specific regulations eg Abrasive Wheel Regulations, Electricity Regulations, Woodworking Regulations</p>
		1.2	<p>List organisational general practices and procedures relevant to an engineering environment</p>	<p><i>Organisational requirements:</i> general practices and procedures of the organisation eg safety policies, codes of practice, safe working practices;</p>
		1.3	<p>Identify the seven warning signs for substances that are harmful</p>	<p><i>Warning signs</i> eg for substances that are harmful, highly flammable, corrosive, toxic, explosive, irritant, oxidising, radioactive</p>
		1.4	<p>Describe when appropriate sources of information would assist compliance with statutory regulations and organisational requirements</p>	<p><i>Sources of information:</i> officials eg safety officers, safety representatives, health and safety inspectors; source of health and safety literature eg on noticeboards, safety surveys; the seven main groups of hazardous substances defined by Classification, Packaging and Labelling of Dangerous Substances Regulations</p>

Learning outcomes	Assessment criteria		Unit amplification
2 Know about accident and emergency procedures	2.1	Describe the correct procedure for a given accident involving injury to self or others	<ul style="list-style-type: none"> □ <i>Procedures for accidents:</i> procedures for receiving first aid treatment; who the qualified first aid person is in the work area and where they can be found; the location of first aid facilities eg first aid box, first aid treatment rooms; the accident reporting and recording procedures to be followed; how to deal with victims of electric shock
	2.2	Describe the correct procedure when an emergency alarm is sounded	<ul style="list-style-type: none"> □ <i>Emergency procedures:</i> emergency procedures with regard to fire and premise evacuation; what the emergency alarms sound like; where the alarm buttons are sited in the work area; where the escape routes are and where personnel should assemble after leaving the premises eg fire assembly point; the location and use of the various fire extinguishing equipment and the organisational policy regarding its use
3 Know about controlling hazards in the engineering workplace	3.1	Identify hazards in the engineering workshop	<ul style="list-style-type: none"> □ <i>Identify hazards:</i> the use of hazard checklists; types of hazards eg hazards associated with 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
	3.2	Identify the control measures to be used to minimise risk for a given engineering environment	<ul style="list-style-type: none"> □ <i>Control measures:</i> eg isolation of the hazard, stopping working activities, lock off and permit to work/entry procedures, provision of safe access and egress, use of guards and fume extraction equipment, use of personal protective equipment □ <i>Engineering environment:</i> typical engineering environment where hazards will be present eg the use of tools, materials and equipment, movement of oil and chemicals, lifting equipment, noisy environment, dealing with electrical or mechanical parts

Learning outcomes	Assessment criteria		Unit amplification
4 Be able to apply safe working practices and procedures	4.1	Prepare yourself ready to carry out an activity in the engineering workshop	<ul style="list-style-type: none"> □ <i>Preparation for an engineering activity:</i> preparation eg wearing protective clothing, checking that this fits correctly and is free from loose or torn material, removal of ties, rings, jewellery and neck chains, wearing of safety equipment as required by the work activities; health and hygiene eg skin care (such as barrier creams and gloves); respiratory matters (such as fume extraction, face masks, breathing apparatus); eyesight protection (such as safety glasses, goggles, full face masks); hearing protection (such as ear plugs, ear defenders); head protection (such as caps with hair restraints, protective helmets); safety footwear; dangers of ingestion and the need for washing hands
	4.2	Work responsibly and use correct manual handling techniques when maintaining a safe working area	<ul style="list-style-type: none"> □ <i>Work responsibly:</i> movement within the work area eg observing restricted area notices, walking not running; acting responsibly at work eg using equipment only for its intended purpose, following approved safety procedures, complying with warning signs □ <i>Manual handling techniques:</i> handling of loads eg pushing, pulling, levering; lifting positions eg from ground level, waist high, overhead, reaching over; the use of lifting aids; when to seek help with lifting a load □ <i>Maintaining a safe working area:</i> good housekeeping arrangements eg maintaining cleanliness of the work area, removal of waste materials, storage of materials, tools, equipment and products; maintenance of access and egress eg clear walkways, emergency exits; control of hazards

Information for tutors

Delivery

This unit is about working safely in an engineering environment. It therefore lends itself to being delivered alongside one of the other practical units that need due regard to operating safely. The unit is designed to enable a range of different engineering applications to be used to embed and assess learners' knowledge about and ability to work safely.

Statutory and organisational requirements must be covered in enough detail to ensure learners know their and others' responsibilities. They should recall their knowledge of these aspects to confirm their awareness of these things before they are exposed to practical activities to demonstrate the safe working. It may be appropriate to devise activities that are straightforward but allow learners to engage in their learning. Activities such as the use of crossword puzzles or simple gapped handouts may be appropriate and/or research of internet sites. This approach may also be suitable for learning outcome 3 where learners need to know about hazards and their control.

The other two learning outcomes, about following accident and emergency procedures and applying safe working practices, may be best addressed through role-play exercises and visits from professional people such as talks from the fire brigade or first aid officers. Practical 'walk throughs' in the workshop set up with hazards would also engage learners when spotting the hazards. Competitions could be set up so learners participate fully. Alternatively, a visit to a local engineering company with a strong focus on health and safety would also be useful. There are many videos and DVDs available to support good health and safety practices.

Assessment

The centre will devise and mark the assessment for this unit.

Learners must meet all assessment criteria to pass the unit.

Outline learning plan

The outline learning plan has been included in this unit as guidance.

Topic and suggested assignments/activities

Know about statutory regulations and organisational requirements

Whole-class, tutor-led discussions supported by small-group internet research into different regulations and organisational requirements.

Individual activity run a competition to see who can find the most useful sources of information about complying with regulations and organisational requirements.

Learners devise and play each others' crossword games on the terminology found in health and safety regulations.

Either watch DVD/video or arrange for a visiting speaker to talk/present the importance of regulation in health and safety.

Some of the assessment of this part of the unit is likely to be achieved within activities for one of the other practical units where learners could reflect on their practical activity and list the regulations and general practices and procedures appropriate to their activity, providing they meet the number required by the assessment criteria. However, this must include a further activity to identify the seven warning signs of substances and a written activity to describe when officials and health and safety literature would be used to assist compliance with statutory regulations and organisational requirements.

Know about accident and emergency procedures

Individual activity completing 'gapped handouts' about location points, name and location of first aider etc.

Workshop walk through to identify emergency alarms and escape routes etc.

Visiting speaker, for example fire officer/brigade or safety officer.

Evaluation of example company policies and procedures.

Whole-class, tutor-led discussions supported by small-group role play relating to procedures for accidents and emergency.

Although assessment of this part of the unit could be achieved within activities for one of the other practical units, when learners could be asked questions about the correct procedures, it is more likely that a scenario or role play will be needed that allows learners to reflect on and then describe the correct procedures, as required by the assessment criteria.

Know about controlling hazards in the engineering workplace

Whole-class presentation about hazards and controls.

Visit to an engineering company to see how hazards are controlled – this would complement any learning from learning outcome 1.

Paired activity, walk through the workshop to 'spot' potential hazards. Set up a competition and reward best answers with points.

Individual activity – match hazards with a control.

Assessment of this part of the unit is likely to be achieved through a straightforward knowledge-based assignment involving the identification of hazards and the control measure used to minimise risk for these hazards in an engineering environment.

Topic and suggested assignments/activities

Be able to apply safe working practices and procedures

Run a competition of 2 or 3 groups, with say, 4 or 5 learners in each group, ask them to prepare themselves to carry out different given engineering activities and award points according to how well prepared they are from a safety point of view.

Individual activity – use a gapped handout to identify different safety equipment found in an engineering workshop (see content under learning outcome 4).

Individual activity – practise manual handling for a range of scenarios.

Whole-class, tutor-led activity to identify good health and safety practice in DVD/video.

Assessment of this part of the unit is likely to be achieved within activities for one of the other practical units. Alternatively, a straightforward engineering activity could be devised to ensure learners have opportunities to prepare themselves for a work activity and work responsibly when carrying out a given task, as required by the assessment criteria.

Assessment

Due to the nature of the assessment requirements for this unit it is likely that some evidence could come from activities being carried out in other units. If this is not the case, engineering activities that will have to be arranged to meet the requirements of this unit as a stand-alone assessment instrument. 1.1 and 1.2 could be assessed through a practical activity which involves the need to comply with statutory regulations and organisational requirements but will also need to cover sources of information to be used to meet 1.4. Learners could reflect on their practical experience before listing the regulations and general practices and procedures and describing when sources of information would best be used. Consideration of statutory regulations should be based on the application of the Health and Safety at Work etc Act 1974 but should also include general and specific regulations as listed in the unit content. It would be best to link assessment of the criteria associated with learning outcome 1 with those for learning outcome 4 where learners need to apply safe working practices and procedures. Additionally, learners need to identify the seven warning signs for 1.3 which could be achieved by them recognising a range of images and stating which are which. Further activities could be added to address 4.1 and 4.2 when learners must prepare themselves to carry out an engineering activity and work responsibly when using manual handling techniques and maintaining a safe working area. The evidence would be mainly based on a witness statement/observation record supported by annotated photographs for 4.1 and 4.2 and lists for 1.1 and 1.2, along with an identification of the warning signs and a description of the use of sources of information for 1.3 and 1.4 respectively. Sources of information must include officials, literature and the seven main groups of labelling hazardous substances. Practical work must involve preparation that covers the content listed under learning outcome 4.

A second assignment could be developed to cover 2.1, 2.2, 3.1 and 3.2. This assignment could comprise a practical scenario for the criteria associated with learning outcome 2 where a simulated activity should be arranged to allow learners to follow a procedure for an accident and to react in response to an emergency alarm. They could then be asked to describe the procedures. Alternatively, a 'case

study' could be given and learners asked to describe the correct procedures. It is likely that evidence for this part of this assignment would be a written description. However, for learners unable to respond in this manner a witness statement/observation record could be used. After identifying a range of hazards with a hazard checklist, a further written activity should be developed to allow learners to identify the controls required to reduce the risk in these hazards. Evidence could be in the form of an annotated workshop layout identifying the hazards and a written list of control measures for each.

Suggested resources

Health and Safety Executive – *Essentials of Health and Safety at Work* (HSE Books, 2006) ISBN 0717661792

Health and Safety Executive – *Management of Health and Safety at Work* (HSE Books, 2000) ISBN 0717624889

Health and Safety Executive – *A Guide to Risk Assessment Requirements: Common Provisions in Health and Safety Law* (HSE Books, 1996) ISBN 0717612112

Websites

www.hmsa.gov.uk

www.hse.gov.uk

Essential resources

It would be extremely useful if learners had access to a range of tools and equipment commonly used in engineering. It may be possible to arrange a visit to an engineering company to extend learners awareness of the range of resources used in engineering.

A typical centre engineering workshop should be equipped with the basic requirements of this unit. Including marking out equipment, hand tools, measuring equipment and benches. All supporting auxiliary equipment should also be available together with appropriate safety equipment.

Workshops should be staffed appropriately to ensure health and safety requirements are met. Technician support may be required during practical work.

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	Be able to prepare a work area for hand cutting and shaping activities	1.1 Confirm with a supervisor what has to be done before hand cutting and shaping activities are carried out safely in a work area	<ul style="list-style-type: none"> □ <i>Before starting work:</i> understand the task eg what needs to be carried out, order of operations, tools and equipment, quality checks; personal protection eg eye protection, hair protection, footwear, use of barrier cream, removal of loose clothing and jewellery; regulations and safety procedures; maintenance of access eg clear walkways, emergency exits; the need for good housekeeping eg cleanliness of work area, removal of waste materials; what might go wrong eg damaged materials, tool breakage, finished products not to standard; confirm proposed actions with a supervisor
		1.2 Prepare a work area so that hand cutting and shaping activities can be carried out	<ul style="list-style-type: none"> □ <i>Work area preparation:</i> preparation of area eg tidying up the bench, returning unwanted materials to stores, fitting protection plates to vice jaws; obtain materials to be used; obtain tools and equipment eg marking fluid, rule, scriber, scribing block, protractor, dividers, punch, square, vernier instrument, external micrometer, hacksaw, files, hammer, abrasive tape, vice jaws, centre drill, twist drill, die set, tap set; obtain correct personal protective equipment eg eye protection, hair protection, overalls, safety footwear
		1.3 Check that raw materials are correct and tools are safe to use	<ul style="list-style-type: none"> □ <i>Check that raw materials are correct and tools are safe to use:</i> check materials to ensure right type and size; visually check materials for obvious signs of damage or contamination eg flaws, dirt, rust, excessive burrs; check tools and equipment to ensure that they are in a safe and usable condition eg condition of saw blades, files, file handles, centre drill, twist drills, hand dies, hand taps; check holding and securing arrangements eg vice, clamps, fixtures, chucks, taper, sleeves

Learning outcomes	Assessment criteria		Unit amplification
2 Be able to produce components using hand tools safely	2.1	Mark out components for required operations	<ul style="list-style-type: none"> □ <i>Marking out:</i> preparing materials for marking out eg deburring, producing suitable datum faces/edges, applying a suitable marking medium; marking out workpieces eg datums, centre lines, cutting guide lines, hole positions, profiles; marking out tools eg engineer's rule, scriber, centre punch, hammer, dividers, odd-leg callipers, engineer's square
	2.2	Use appropriate hand tools to safely make components	<ul style="list-style-type: none"> □ <i>Making components:</i> components which combine different fitting operations eg drill drift, drill point angle gauge, drill stand, jaw plates for toolmakers' clamps, other suitable components; simple profiles eg radii, corners, bevells, angles, square edges; holding devices eg bench vice, clamps, fixture; hand tools eg hacksaw, hand drill, drill bits, hammer, taps, dies, files, abrasive cloth
	2.3	Check that components meet the standard required	<ul style="list-style-type: none"> □ <i>Component checks:</i> appearance eg cuts, burrs, sharp edges; tolerance eg linear +/- 0.25 mm, flat and square +/-0.1mm/25 mm, angle +/- 1 degree, surface finish 1.6 µm; measuring equipment eg micrometer, vernier, rule, square, protractor, gauges
	2.4	Clean down work areas and return tools to storage	<ul style="list-style-type: none"> □ <i>Cleaning down and putting away:</i> collection of swarf eg brush, collection pan, recycling container; tools and equipment eg cleaning cloth, tool case, toolbox; return to stores eg tools, equipment, surplus materials; inspection of work area eg visual, sign off

Information for tutors

Delivery

This unit is essentially practical and learners would benefit from practising their skills before being assessed. Learners should be encouraged to think about the processes needed and actions to be taken to prepare their workplace and then make basic engineering components. Learners should have opportunities to talk about what they are going to do and how they propose to overcome any problems which may occur while they are manufacturing components. It is important that they understand where hand tools can be used and the safety aspects of using these tools.

A small number of components should be made which learners can keep and perhaps use later in their engineering studies or at work. At this level learners do not need to produce components that are complicated.

Outline learning plan

The outline learning plan has been included in this unit as guidance.

Topic and suggested assignments/activities

Confirm with a supervisor what has to be done before hand cutting and shaping activities are carried out safely in a work area.

Tutor-led unit introduction covering content, method of working and assessment.

Tutor-led overview of the hand tool skills learners will develop.

Whole class, tutor-led discussion about how engineers plan the manufacture of engineering products. Using one or two basic components as exemplars tutor presents drawing(s)/sketch(es), list of tools, materials, sequence of operations, quality checks.

Tutor-led discussion about PPE, where and when it is necessary and how it works.

Tutor-led discussion about the need to confirm proposed activities with a supervisor.

Small-group activity to plan the production of a single given component.

Prepare a work area so that hand cutting and shaping activities can be carried out.

Whole-class, tutor-led discussion about the need to prepare work areas – present exemplars of poor and good preparation.

Paired activity to identify hazards/bad practices in workshops – presented as images with a checklist to complete.

Check that raw materials are correct and tools safe to use.

Whole-class, tutor-led discussion about why raw materials and tools should be checked before being used. Tutor presents a small range of exemplars which show the consequences of working with materials and tools which are not fit for purpose.

Small-group activity to identify, from images or actual hardware, raw materials which are damaged or contaminated and hand tools which are unsafe and should not be used.

Topic and suggested assignments/activities

Mark out components for required operations.

Tutor-led demonstration of marking out followed by individual activity.

Use appropriate hand tools to make components safely.

Tutor demonstration of how to use the hand tools learners will be working with.

Individual activities to develop skills when using hand tools – cutting, filing, drilling and thread cutting exercises.

Check that components meet the required standard.

Whole-class, tutor-led discussion about why components should be checked against the specification.

Paired activity to check the dimensions of a basic component against its specification.

Clean down work areas and return tools to storage.

Tutor-led discussion about the need for 'good housekeeping' in engineering workshops.

Assessment activity – prepare a work area and manufacture basic components using hand tools.

Individual activity to manufacture components using processes, tools and procedures which address the unit content and the seven assessment criteria.

Seek and respond to guidance from their tutor.

Tutors should encourage learners to have a dialogue with them. This could be prompted by the tutor asking learners to explain what they are doing, why they are doing it and how they are able to work safely. This does not require a formal allocation of time and should occur during delivery and assessment of the unit.

Assessment

The centre will devise and mark the assessment for this unit.

Learners must meet all assessment criteria to pass the unit.

Learners will benefit from access to a range of assessment opportunities. Examples might include observed practice, recorded explanations, checklists and annotated photographic records. Entries within a logbook and a finished product inspection record, both validated by the tutor, are also appropriate methods for recording achievement. Competence when carrying out practical activities should be evidenced through witness testimonies or observation records signed by the tutor.

Suggested resources

Books

Boyce et al – *Engineering Level 1 Foundation Diploma* (Edexcel/Pearson, 2008)
ISBN 9780435756253

Chapman et al – *GNVQ Intermediate Engineering* (Longman, 2000)
ISBN 9780582381384

Darbyshire et al – *GNVQ Intermediate Engineering* (Nelson Thornes, 1997)
ISBN 9780748729364

Timings R L – *Basic Manufacturing* (Newnes, 1998) ISBN 9780750659901

Timings R L – *Manufacturing Technology Volume One* (Longman, 1998)
ISBN 9780582356931

Tooley M – *Engineering GNVQ Intermediate* (Butterworth-Heinemann, 2006)
ISBN 9780750625975

Waters F – *Fundamentals of Manufacturing for Engineers* (UCL Press, 1996)
ISBN 9781857283389

Tutor resource disks

Boyce et al – *Engineering Level 1 Foundation Diploma* (Edexcel/Pearson, 2008)
ISBN 9780435756260

Websites

www.hse.gov.uk

Essential resources

It would be extremely useful if learners had access to a range of equipment commonly used in engineering. It may be possible to arrange a visit to an engineering company to extend learner awareness of the range of resources used in engineering.

A typical centre engineering workshop should be equipped with the basic requirements of this unit including marking out equipment, hand tools, measuring equipment and bench/pillar drilling machines. All supporting auxiliary equipment should also be available together with appropriate safety equipment.

Workshops should be staffed appropriately to ensure health and safety requirements are met. Technician support may be required during practical work.

Information for tutors

Delivery

This unit is essentially practical and learners will benefit from practising their skills before being assessed. Learners should think about the drilling operations to be carried out and actions to be taken to prepare their workplace. Learners should have opportunities to talk about what they are going to do and how they propose to overcome any problems when using a drilling machine. It is important that learners understand the hazards involved when working with powered machinery and the measures which must be taken in order to minimise risk. They should also be fully aware of what to do in the case of an emergency.

At this level it is not appropriate for learners to work with complicated components.

Outline learning plan

The outline learning plan has been included in this unit as guidance.

Topic and suggested assignments/activities

Confirm with a supervisor what has to be done before drilling activities are carried out safely in a work area.

Tutor-led unit introduction covering content, method of working and assessment.

Tutor-led overview of the drilling skills learners will develop.

Whole-class, tutor-led discussion about the steps involved when using a bench/pedestal drill to make holes in materials.

Tutor-led discussion about PPE, where and when it is necessary and how it works.

Tutor-led discussion about the need to confirm proposed activities with a supervisor.

Small-group activity to plan how to drill different types of hole.

Prepare a work area ready for drilling activities to be carried out.

Whole-class, tutor-led discussion about the need to prepare work areas – present exemplars of good and bad preparation.

Paired activity to identify hazards/bad practices when working with drilling machines – presented as images with a checklist to complete.

Tutor-led discussion about the emergency procedures that apply to rotating machinery.

Check that machinery and tools are safe to use.

Whole-class, tutor-led discussion about why machinery and tools should be checked before being used. Tutor presents a small range of examples which show the consequences of working with machinery and tools that are not fit for purpose.

Small-group activity to identify the risks involved when drilling holes and the measures which should be taken to reduce these risks.

Topic and suggested assignments/activities

Set up a bench/pedestal drilling machine which can be used to carry out drilling activities.

Tutor-led demonstration of setting up and using a bench/pedestal drilling machine.

Paired activity setting up a bench/pedestal drilling machine – selecting tools and holding device, selecting and adjusting spindle speed, adjusting table height, fitting chucks and tapers.

Use a bench/pedestal drilling machine to carry out drilling activities safely to a required specification.

Paired and individual activities to develop skills when working with a bench/pedestal drilling machine – positioning drill bits, trial cuts, checking accuracy, different types of hole, application of lubricants.

Paired activity – machine isolation and clean down.

Check that drilled holes are to the required standard.

Whole-class, tutor-led discussion about why machined features should be checked against the specification.

Paired activity to check the positional accuracy and diameters of drilled/reamed holes.

Assessment activity – prepare a work area and carry out drilling activities using a bench/pedestal drilling machine.

Individual activity to drill holes and carry out inspection checks which address the unit content and six assessment criteria.

Seek and respond to guidance from the tutor.

Tutors should encourage learners to have a dialogue with them. This could be prompted by the tutor asking learners to explain what they are doing, why they are doing it and how they are able to work safely. This does not require a formal allocation of time and should occur during delivery and assessment of the unit.

Assessment

Learners will benefit from access to a range of assessment opportunities. Examples might include observed practice, recorded explanations, checklists and annotated photographic records. Entries within a logbook and an inspection record for each drilling operation, validated by the tutor, are also appropriate methods for recording achievement. Competence when carrying out practical activities should be evidenced through witness testimonies or observation records signed by the tutor.

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
<p>1 Be able to prepare a work area for producing components using a bench/pedestal drilling machine</p>	1.1	Confirm with a supervisor what has to be done before drilling activities are carried out safely in a work area	<ul style="list-style-type: none"> □ <i>Before starting work:</i> understand the task eg what needs to be carried out, order of operations, tools and equipment, quality checks; personal protection eg eye protection, hair protection, removal of loose clothing and jewellery, footwear, use of barrier cream; regulations and safety procedures; maintenance of access eg clear walkways, emergency exits; the need for good housekeeping eg cleanliness of work area, removal of waste materials; what might go wrong eg damaged materials, tool breakage, finished holes not to standard; confirm proposed actions with a supervisor
	1.2	Prepare a work area ready for drilling activities to be carried out	<ul style="list-style-type: none"> □ <i>Work area preparation:</i> single spindle bench/pedestal drilling machine; obtain components to be drilled; select tools and equipment eg marking out fluid, rule, square, centre punch, hammer, depth and plug gauges, chuck, taper sleeve, drill bits, reamers, lubricant; obtain correct personal protective equipment eg eye protection, hair protection, overalls, safety footwear; identify procedure for machine start/stop in both normal and emergency situations
	1.3	Check that machinery and tools are safe to use	<ul style="list-style-type: none"> □ <i>Check that machinery and tools are safe to use:</i> condition of machine eg guards, isolator switch, start/stop switch, emergency stop switch, limit switch, cutting lubricants, drill chuck, spindle taper sleeves, table; condition of cutting tools eg sharpness, tip angle, shank straightness, surface condition of shank; condition of holding devices eg hand vice, machine vice, angle brackets, clamps

Learning outcomes	Assessment criteria		Unit amplification
<p>2 Be able to safely carry out drilling activities using a bench/pedestal drilling machine.</p>	2.1	Set up a bench/pedestal drilling machine which can be used to carry out drilling activities	<ul style="list-style-type: none"> □ Set up a <i>bench/pedestal drilling machine</i>: machine isolation before mounting cutting tools or work handling devices; adjustment of table height and position; mounting work piece eg hand vice, machine vice, angle brackets, clamping to machine table; mounting and securing of tools eg chuck, taper sleeve, centre drill, twist drill, pilot drill, reamer, counterbore tool, countersinking tool; drill shanks eg straight, morse taper; machine settings and adjustments eg spindle speed, feed rate, guards, safety devices; cutting lubricants eg fluids, compounds
	2.2	Use a bench/pedestal drilling machine to safely carry out drilling activities to a required specification	<ul style="list-style-type: none"> □ Use a <i>bench/pedestal drilling machine</i>: techniques of positioning drills to marking out eg use of centre drills, boxed holes, taking trial cuts, checking accuracy; drilling techniques eg through holes, holes with a given depth, flat bottomed holes, counterbores, countersinks, reamed holes, correcting holes which are off-centre; drill feeding eg manual, power; applying cutting lubricants eg pressure fed, by brush; good housekeeping eg machine isolation, cleaning down, return of tools and equipment into safe storage
	2.3	Check that drilled holes are to the required standard.	<ul style="list-style-type: none"> □ Use a <i>bench/pedestal drilling machine</i>: techniques of positioning drills to marking out eg use of centre drills, boxed holes, taking trial cuts, checking accuracy; drilling techniques eg through holes, holes with a given depth, flat bottomed holes, counterbores, countersinks, reamed holes, correcting holes which are off-centre; drill feeding eg manual, power; applying cutting lubricants eg pressure fed, by brush; good housekeeping eg machine isolation, cleaning down, return of tools and equipment into safe storage

Suggested resources

Books

Boyce et al – *Engineering Level 1 Foundation Diploma* (Edexcel/Pearson, 2008)
ISBN 9780435756253

Chapman et al – *GNVQ Intermediate Engineering* (Longman, 2000)
ISBN 9780582381384

Darbyshire et al – *GNVQ Intermediate Engineering* (Nelson Thornes, 1997)
ISBN 9780748729364

Timings R L – *Basic Manufacturing* (Newnes, 1998) ISBN 9780750659901

Timings R L – *Manufacturing Technology Volume One* (Longman, 1998)
ISBN 9780582356931

Tooley M – *Engineering GNVQ Intermediate* (Butterworth-Heinemann, 1996)
ISBN 9780750625975

Waters F – *Fundamentals of Manufacturing for Engineers* (UCL Press, 1996)
ISBN 9781857283389

Tutor resource disks

Boyce et al – *Engineering Level 1 Foundation Diploma* (Edexcel/Pearson, 2008)
ISBN 9780435756260

Websites

www.hse.gov.uk

Unit 4: Developing Skills in Planning and Making a Machined Product

Unit reference number: Y/600/9140

QCF level: 1

Credit value: 6

Guided learning hours: 60

Unit aim

This unit will enable learners to develop the skills needed to plan and carry out the manufacture of a product using a small range of materials, machinery and tools. This unit provides some of the knowledge, understanding and skills for the Level 1 Performing Engineering Operations NOS Unit 7: Using Lathes for Turning Operations, NOS Unit 8: Using Milling Machines and NOS Unit 9: Using Grinding Machines.

Unit introduction

In this unit learners will be introduced to some of the practical skills needed to carry out machining operation using machine tools. They will consider the importance of communicating in technical terms by using and interpreting engineering drawings, and investigate what is involved when planning the manufacture of a product. Learners will then go on to manufacture a product and carry out inspection procedures to check that it conforms to a given specification.

Learners will consider the importance of using the correct raw materials, working safely with powered machinery and the need to check that guards, isolation switches, tools and equipment are in a safe and useable condition at all times. They will appreciate that before they start up a machine they must ensure that the work piece is fixed correctly, tools are mounted properly and the appropriate personal protective equipment (PPE) is being used.

This unit will help learners to appreciate the importance of following give instructions when carrying out activities and recognise what might go wrong when working with machine tools. Cleaning down work areas on completion of activities and the return of tools and equipment to safe storage are considered in the context of good housekeeping and efficient working.

Essential resources

It would be extremely useful if learners had access to a range of equipment commonly used in engineering. It may be possible to arrange a visit to an engineering company to extend learner awareness of the range of resources used in engineering.

A typical centre engineering workshop should be equipped with the basic requirements of this unit including a range of grinding machines, milling machines and turning machines. All supporting auxiliary equipment should also be available together with appropriate safety equipment.

Workshops should be staffed appropriately to ensure health and safety requirements are met. Technician support may be required during practical work.

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 about equipment, tools and materials required to make machined products	1.1	List the types of equipment used when making machined products	□	<i>Equipment:</i> centre lathe; milling machine eg vertical, horizontal, universal; grinding machine eg cylindrical, surface; key features of the equipment eg motor, drive system, rotating parts, slideways, table, tool holding, guards, work holding, start/stop
		1.2	List the tools and work holding devices used when making machined products	□	<i>Tooling:</i> cutting tools eg single point, parting off, end mill, side cutter, face cutter, end mill, slot mill, centre drill, twist drill, reamer, tap, die, grinding wheels; work holding equipment eg vice, alignment tennons, chucks, centres, clamps, angle plates, special fixtures, magnetic plates
		1.3	List the types of materials from which machined products can be made	□	<i>Materials:</i> ferrous eg cast iron, plain carbon steels; non-ferrous eg aluminium, copper, brass; non-metallic eg polythene, PVC, nylon, bakelite, melamine
2	Be able to use simple engineering drawings to plan the manufacture of a machined product	2.1	Identify features of a component by interpreting an engineering drawing	□	<i>Engineering drawings:</i> 2D projection eg 1st angle, 3rd angle; isometric projection; details eg dimensions, text, abbreviations, hidden detail, sections; sketches
		2.2	List the steps in a plan which can be followed when manufacturing a product	□	<i>Planning:</i> raw materials; processes; tooling; sequence of operations; machine settings eg speed, feed, depth of cut; safe working

Learning outcomes	Assessment criteria		Unit amplification
3	3.1	Confirm with a supervisor what has to be done before manufacturing activities are carried out	<ul style="list-style-type: none"> □ <i>Before stating work:</i> understand the task eg what needs to be carried, order of operations, tools and equipment, quality checks; personal protection eg eye protection, hair protection, removal of loose clothing and jewellery, footwear, use of barrier cream; regulations and safety procedures; maintenance of access eg clear walkways, emergency exits; understand the need for good housekeeping eg cleanliness of work area, removal of waste materials; understand what might go wrong eg damaged materials, tool breakage, finished products not to standard; confirm proposed actions with a supervisor
	3.2	Prepare a manufacturing work area	<ul style="list-style-type: none"> □ <i>Work area preparation:</i> select appropriate machinery eg milling machine, centre lathe, grinding machine; obtain raw materials eg ferrous, non-ferrous, non-metallic; select tools and equipment; obtain correct personal protective equipment eg eye protection, hair protection, overalls, safety footwear; identify procedure for machine start/stop in both normal and emergency situations
	3.3	Check raw materials are correct and that machinery and tools are safe to use	<ul style="list-style-type: none"> □ <i>Check raw materials are correct and that machinery and tools are safe to use:</i> check materials eg correct type, correct size, free from defects; condition of machine eg guards, isolator switch, start/stop switch, emergency stop switch, limit switch, cutting lubricants; condition of cutting tools eg sharpness, tip angle, damaged teeth; condition of grinding wheels eg damage, cracks, balance, requiring dressing, condition of holding devices eg chucks eg 3 jaw, 4 jaw, collets, centres, machine vice, angle plate, blocks, clamps, magnetic plate

Learning outcomes	Assessment criteria		Unit amplification
<p>4 Be able to make an engineered product to a specification, using appropriate equipment and processes which are carried out in a safe manner</p>	4.1	Use machines, tools and equipment to manufacture a product	<ul style="list-style-type: none"> □ <i>Making a machined component:</i> turning eg plain and stepped diameters, faces, drilled and reamed holes, chamfers and radii, knurling, grooves and undercuts, parting off; milling eg horizontal faces, parallel faces, vertical faces, open-ended slot, enclosed slot; grinding eg flat surface, cylindrical surface, shoulder; machine settings and adjustments eg spindle speed, feed rate, guards, safety devices; cutting lubricants eg fluids, compounds
	4.2	Check that the product meets the standard required	<ul style="list-style-type: none"> □ <i>Component checks:</i> appearance eg cuts, burrs, sharp edges; tolerances for turning eg dimensions +/- 0.25 mm, surface finish 1.6 um; tolerances for milling eg dimensions +/- 0.25 mm, flatness and squareness within 0.125 mm per 25 mm, surface finish 1.6 um; tolerances for grinding eg dimensions +/- 0.1, flatness and squareness within 0.025 per 25 mm, surface finish 0.4 um; measuring equipment eg micrometer, vernier, rule, gauges, dial test indicator
	4.3	Clean down work area and return tools to storage	<ul style="list-style-type: none"> □ <i>Cleaning down and putting away:</i> collection of swarf eg brush, collection pan, recycling container; tools and equipment eg cleaning cloth, tool case, toolbox, remove cutting tools; return to stores eg tools, equipment, surplus materials; machine isolation, inspection of work area eg visual, sign off

Information for tutors

Delivery

This unit is essentially practical and learners would benefit from practising their skills before being assessed. Learners should think about the processes needed and actions to be taken to prepare their workplace and then make basic components. Learners should have opportunities to talk about what they are going to do and how they propose to overcome any problems which may occur while they are using machine tools. It is important that learners understand the hazards involved when working with powered machinery and the measures which must be taken in order to minimise risk. They should also be fully aware of what to do in the case of an emergency.

The development of a production plan should be encouraged together with the use of engineering drawings which detail the features to be machined.

The product should be relatively simple and made up from a small number of components which will allow use of the different machining processes to be demonstrated and assessed, for example a small hand vice, toolmaker's clamp, adjustable square. It will add interest if learners can keep what they manufacture.

Outline learning plan

The outline learning plan has been included in this unit as guidance.

Topic and suggested assignments/activities

List the type of equipment used when making machined products.

Tutor-led unit introduction covering content, method of working and assessment.

Tutor-led overview of the manufacturing skills learners will develop.

Small-group activity to identify the key features of a small range of given machine tools.

List the tools and work holding devices used when making machined products.

Whole-class, tutor-led discussion about tools and work holding equipment.

Paired activity to match tools and work holding devices to appropriate machinery.

List the types of materials machined products can be made from.

Whole-class, tutor-led discussion about the types of materials which are available to use in a workshop.

Paired activity to identify samples of given materials. Follow up by looking at machined components – identify the material and think about the manufacturing process it is used within.

Assessment activity – types of equipment, tools and materials used when manufacturing products.

Individual activity based on a given engineered product which addresses the unit content and assessment criteria 1.1,1.2 and 1.3.

Topic and suggested assignments/activities

Identify features of a component by interpreting an engineering drawing.

Tutor-led discussion about different types of engineering drawings – present simple exemplars.

Paired activity to extract information from a given engineering drawing.

Paired activity to identify key features of components from 2D orthographic and isometric projection drawings.

List the steps in a plan to follow when manufacturing a product.

Whole-class, tutor-led discussion about how engineers plan the manufacture of engineering products. Using one or two basic components as examples – tutor presents drawing(s)/sketch(es), list of tools, machines, materials, sequence of operations, quality checks.

Paired activity to plan the manufacture of a given product.

Assessment activity – identify features of a component and plan its manufacture.

Individual activity based on a given engineered product which is made up from a small number of basic components. The activity should address the unit content and assessment criteria 2.1 and 2.2.

Confirm with a supervisor what has to be carried out before manufacturing activities are carried out.

Tutor-led discussion about PPE, where and when it is necessary and how it works.

Individual activity – identify specific risks when operating a lathe, milling machine and a grinding machine and the actions to take reduce risk of injury.

Tutor-led discussion about the need to confirm proposed activities with a supervisor.

Tutor-led discussion about emergency procedures to be followed if problems arise when working with machine tools.

Prepare a manufacturing work area.

Whole-class, tutor-led discussion about the need to prepare manufacturing work areas – present exemplars of poor and good preparation.

Paired activity to identify hazards/bad practices in workshops – presented as images with a checklist to complete.

Check raw materials are correct and that machinery and tools are safe to use.

Whole-class, tutor-led discussion about why raw materials, machinery and tools should be checked before use. Tutor presents a small range of examples which show the consequences of working with materials, machinery and tools that are not fit for purpose.

Small-group activity to identify the risks involved when working with lathes, milling machines and grinding machines and the measures which should be taken to reduce these risks.

Topic and suggested assignments/activities

Use machines, tools and equipment to manufacture a product.

Paired and individual activities to develop skills when working with machine tools – work and tool holding, trial cuts, checking accuracy, different type of machining process, application of lubricants.

Individual manufacture of components using machine tools.

Setting up and adjusting machine settings, cutting materials and carrying out dimensional checks.

Paired activity – machine isolation and clean down.

Check that the product meets the required standard.

Whole-class, tutor-led discussion about why machined features should be checked against the specification.

Paired activity to check that the manufactured product meets the specification.

Clean down work area and return tools to storage.

Tutor-led discussion about the need for 'good housekeeping' in engineering workshops.

Paired activity – machine isolation, clean down, return of tools, equipment and unused raw materials to storage.

Assessment activity – prepare a work area and manufacture a product using machine tools.

Individual activity to manufacture a product using processes, tools and procedures which address the unit content and assessment criteria 3.1, 3.2, 3.3, 4.1, 4.2, 4.3. This assessment activity is linked to the previous one covering 2.1 and 2.2.

Seek and respond to guidance from the tutor.

Tutors should encourage learners to have a dialogue with them. This could be prompted by the tutor asking learners to explain what they are doing, why they are doing it and how they are able to work safely. This does not require a formal allocation of time and should occur during delivery and assessment of the unit.

Assessment

The centre will devise and mark the assessment for this unit.

Learners must meet all assessment criteria to pass the unit.

Learners will benefit from access to a range of assessment opportunities. Examples might include observed practice, recorded explanations, checklists and annotated photographic records. Entries within a logbook and a finished product inspection record, both validated by the tutor, are also appropriate methods for recording achievement. Competence in practical activities should be evidenced through witness testimonies or observation records signed by the tutor.

Suggested resources

Books

Boyce et al – *Engineering Level 1 Foundation Diploma* (Edexcel/Pearson, 2008)
ISBN 9780435756253

Chapman et al – *GNVQ Intermediate Engineering* (Longman, 2000)
ISBN 9780582381384

Darbyshire et al – *GNVQ Intermediate Engineering* (Nelson Thornes, 1997)
ISBN 9780748729364

Jensen C – *Interpreting Engineering Drawings* (Delmar, 2001) 9781418055738

Simmons C and Maguire D – *Manual of Engineering Drawing to British and International Standards* (Butterworth-Heinemann, 2003) ISBN 9780750651202

Timings R L – *Basic Manufacturing* (Newnes, 1998) ISBN 9780750659901

Timings R L – *Manufacturing Technology Volume One* (Longman, 1998)
ISBN 9780582356931

Tooley M – *Engineering GNVQ Intermediate* (Butterworth-Heinemann, 1996)
ISBN 9780750625975

Waters F – *Fundamentals of Manufacturing for Engineers* (UCL Press, 1996)
ISBN 9781857283389

Other publications

British Standard PP 8888 – 1: 2001 (A school version)

Tutor resource disks

Boyce et al – *Engineering Level 1 Foundation Diploma* (Edexcel/Pearson, 2008)
ISBN 9780435756260

Websites

www.hse.gov.uk

Unit 5: **Developing Skills in Assembling Mechanical Components**

Unit reference number: H/600/9142

QCF level: 1

Credit value: 3

Guided learning hours: 30

Unit aim

This unit will enable learners to develop manual skills when working with basic assembly tools, so that they can apply them to assembling a product from a small number of mechanical components. This unit provides some of the knowledge, understanding and skills for the Level 1 Performing Engineering Operations NOS Unit 5: Assembling Mechanical Components.

Unit introduction

In this unit learners will be introduced to the practical skills needed to assemble components in an engineering workshop. They will explore why they need to understand what they are going to carry out and prepare the work area correctly. Using basic hand tools and measuring equipment, which they have selected, learners will assemble components into finished products which meet given specifications.

Learners will consider the importance of working safely in an engineering workshop and the need to check that tools and equipment are in a safe and useable condition at all times. They will also understand the requirement to check that components are the correct type and in good condition before starting work. Selection of the correct fastening devices and special tools, such as a torque wrench, is also covered in this unit. As assembly processes may involve the use of cleaning substances and lubricants, learners will need guidance on the precautions to take when using them.

Cleaning down work areas on completion of activities and the return of tools and equipment into safe storage are considered in the context of good housekeeping and efficient working.

This unit will help learners to appreciate the importance of following given instructions carrying out activities and to recognise the problems which may occur when assembling mechanical components.

Essential resources

It would be extremely useful if learners had access to a range of equipment commonly used in engineering. It may be possible to arrange a visit to an engineering company to extend learner awareness of the range of resources used in engineering.

A typical centre engineering workshop should be equipped with the basic requirements of this unit including a range of mechanical fastening devices, tools and equipment for assembly operations. All supporting auxiliary equipment should also be available together with appropriate safety equipment.

Workshops should be staffed appropriately to ensure health and safety requirements are met. Technician support may be required during practical work.

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	Be able to prepare a work area in readiness for assembly operations	1.1	Confirm with a supervisor what has to be done before assembly operations are carried out safely	<ul style="list-style-type: none"> □ <i>Before starting work:</i> understand the task eg what needs to be carried out, order of operations, tools and equipment, quality checks; personal protection eg eye protection, hair protection, footwear, use of barrier cream, removal of loose clothing and jewellery; regulations and safety procedures; maintenance of access eg clear walkways, emergency exits; understand the need for good housekeeping eg cleanliness of work area, removal of waste materials; understand what might go wrong eg damaged components, shortage of fastening devices, finished assembly not to standard; confirm proposed actions with a supervisor
		1.2	Prepare a work area ready for the assembly of components	<ul style="list-style-type: none"> □ <i>Work area preparation:</i> bench preparation eg tidy up, plan layout of components; consumables eg oil, grease, sealant, gasket; services eg electrical, compressed air; obtain components to be assembled; obtain instructional materials eg assembly drawing, parts list, assembly instructions; obtain appropriate fastening devices; select tools and equipment; obtain correct personal protective equipment eg eye protection, hair protection, overalls, safety footwear
		1.3	Check components are correct and that tools and equipment are safe to use	<ul style="list-style-type: none"> □ <i>Check that components are correct and equipment safe to use:</i> check components eg correct quantity, screw threads undamaged, free from contamination, defects, burrs, sharp edges; condition of tools eg screwdrivers, pliers, feeler gauges, mallets, spanners, keys, alignment devices, punches, measuring equipment, lifting equipment

Learning outcomes	Assessment criteria		Unit amplification
2 Be able to carry out assembly operations using mechanical components	2.1	Use appropriate tools to assemble components	<ul style="list-style-type: none"> □ <i>Assembling components:</i> assembly procedures eg positioning, alignment, shim adjustment, securing, torque tightening; fastening/securing devices eg screws, nuts, bolts, machine screws, washers, rivets, tab washers, wire locks, locking nuts, circlips, pins, dowels, keys, rivets; minimum of six components eg pulley mechanism, simple crank mechanism, simple gearbox assembly, bearings, seals, shafts, chains, sprockets, cams and followers, springs, belts, gaskets
	2.2	Check that the finished assembly conforms to specified limits of accuracy	<ul style="list-style-type: none"> □ <i>Check assembly meets required standard:</i> checking for operation eg correct movement of sliding and rotating parts, correct torque applied to critical fastenings, end float of shafts, operating clearances on valves or actuators; visual inspection eg correctness of fit at critical stages during assembly, correct orientation of cover plates
	2.3	Clean down work area and return tools and equipment to storage.	<ul style="list-style-type: none"> □ <i>Cleaning down and putting away:</i> tools and equipment eg cleaning cloth, tool case, toolbox; return to storage eg tools, equipment, surplus fastenings; close down services eg electrical, compressed air eg inspection of work area eg visual, sign off

Information for tutors

Delivery

This unit is essentially practical and learners would benefit from practising their skills before being assessed. Learners should think about the processes needed and actions to be taken to prepare their workplace and then assemble components into a basic assembly. Learners should have opportunities to talk about what they are going to do and how they propose to overcome any problems which may occur while they are assembling components. It is important that they understand the safety aspects of using hand and powered assembly tools and the measures which must be taken in order to minimise risk. They should also be fully aware of what to do in the case of an emergency.

Outline learning plan

The outline learning plan has been included in this unit as guidance.

Topic and suggested assignments/activities

Confirm with a supervisor what has to be done before assembly operations are carried out safely.

Tutor-led unit introduction covering content, method of working and assessment.

Tutor-led overview of the hand assembly skills learners will develop.

Whole-class, tutor-led discussion about how engineers plan the assembly of engineering products. Using one or two simple products as examples – tutor presents drawing(s)/sketch(es), list of tools, components, fastening, sequence of operations, quality checks.

Tutor-led discussion about PPE, where and when it is necessary and how it works.

Tutor-led discussion about the need to confirm proposed activities with a supervisor.

Small-group activity to plan the assembly of a single given product.

Prepare a work area ready for the assembly of components.

Whole-class, tutor-led discussion about the need to prepare work areas – present examples of poor and good preparation.

Paired activity to identify hazards/bad practices in workshops – presented as images with a checklist to complete.

Check components are correct and that tools and equipment are safe to use.

Whole-class, tutor-led discussion about why components, tools and equipment should be checked before being used. Tutor presents an example which shows the consequences of working with assembly tools that are not fit for purpose.

Small-group activity to identify, from images, problems which can occur when assembling components.

Tutor-led discussion about special precautions to take when working with lubricants, cleaning substances, hydraulic oil and compressed air.

Topic and suggested assignments/activities

Use appropriate tools to assemble components.

Tutor demonstration of assembly techniques followed by assembly of a product.

Individual activities to develop basic assembly skills using hand tools.

Individual and paired activities to assemble products from given components referring to parts schedules, drawings and manuals.

Check that the finished assembly conforms to specified limits of accuracy.

Whole-class, tutor-led discussion about why assembled components should be checked against the specification.

Individual activity to check an assembled product against its specification – dimensional and operational features.

Clean down work area and return tools and equipment to storage.

Tutor-led discussion about the need for 'good housekeeping' in engineering workshops and the correct storage of tools and equipment.

Assessment activity – prepare a work area and assemble components using hand tools.

Individual activity to assemble components using tools and procedures which address the unit content and six assessment criteria.

Seek and respond to guidance from the tutor.

Tutors should encourage learners to have a dialogue with them. This could be prompted by the tutor asking learners to explain what they are doing, why they are doing it and how they are able to work safely. This does not require a formal allocation of time and should occur during delivery and assessment of the unit.

Assessment

The centre will devise and mark the assessment for this unit.

Learners must meet all assessment criteria to pass the unit.

Learners will benefit from access to range of assessment opportunities. Examples might include observed practice, recorded explanations, checklists and annotated photographic records. Entries within a logbook and a finished assembly inspection report, both validated by the tutor, are also appropriate methods for recording achievement. Competence in practical activities should be evidenced through witness testimonies or observation records signed by the tutor.

Suggested resources

Textbooks

Boyce et al – *Engineering Level 1 Foundation Diploma* (Edexcel/Pearson, 2008)
ISBN 9780435756253

Salmon D – *NVQ Engineering Level 2 Mandatory Units* (Longman, 1997)
ISBN 9780582302983

Salmon D – *NVQ Engineering Level 2 Mechanical Units* (Longman, 2002)
ISBN 9780750654067

Other publications

SEMTA – Trainees Book, Training Module for Maintaining Mechanical Devices and Systems (Training Publications Ltd 2001)

SEMTA – Instructors Manual, Training Module for Maintaining Mechanical Devices and Systems (Training Publications Ltd 2001)

Tutor resource disks

Boyce et al – *Engineering Level 1 Foundation Diploma* (Edexcel/Pearson, 2008)
ISBN 9780435756260

Websites

www.hse.gov.uk

Essential resources

It would be extremely useful if learners had access to a range of equipment commonly used in engineering. It may be possible to arrange a visit to an engineering company to extend learner awareness of the range of resources used in engineering.

A typical centre engineering workshop should be equipped with the basic requirements of this unit including a range of welding process equipment, for example oxy fuel-gas, manual metal arc, gas-shielded arc. All supporting auxiliary equipment should also be available together with appropriate safety equipment.

Workshops should be staffed appropriately to ensure health and safety requirements are met. Technician support may be required during practical work.

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 Be able to prepare a work area in readiness for welding operations	1.1	Confirm with a supervisor what has to be done before welding operations are carried out safely	<ul style="list-style-type: none"> □ <i>Before starting work:</i> understand the task eg what needs to be carried out, order of operations, tools and equipment, quality checks; personal protection eg eye protection, lens filters, hair protection, footwear, use of barrier cream, removal of loose clothing and jewellery; regulations and safety procedures eg handling hot material, fume extraction, protective screens, initiating arc/flame; maintenance of access eg clear walkways, emergency exits; understand the need for good housekeeping eg cleanliness of work area, eliminating potential hazards; understand what might go wrong eg materials of the wrong size, an equipment fault develops, consumables/gases run out, finished welds not to standard; confirm proposed actions with a supervisor
	1.2	Prepare a work area ready for the welding of materials	<ul style="list-style-type: none"> □ <i>Work area preparation:</i> select appropriate welding equipment eg manual metal arc, oxy fuel-gas, TIG, MIG/MAG; obtain materials to be welded eg carbon steel, stainless steel, aluminium; select appropriate consumables eg filler wire, filler rod, electrode; select hand tools eg clamps, vice, hammers, rule, square, wire brush; obtain correct personal protective equipment eg eye protection, hair protection, overalls, safety footwear; identify procedures for equipment start up/close down in both normal and emergency situations
	1.3	Check that materials are correct and tools and equipment are safe to use	<ul style="list-style-type: none"> □ <i>Check that materials are correct and equipment is safe to use:</i> check materials to ensure right type and size; check materials are free from excessive contamination eg rust, oil, grease, dirt; check condition and correct assembly of equipment eg power cables, earth returns, gas hoses, regulators, safety valves, torch/electrode holders, gas leaks, lens filters, clamps

Learning outcomes	Assessment criteria		Unit amplification
2	2.1	Use appropriate equipment to safely weld materials together	<ul style="list-style-type: none"> □ Use equipment to weld materials together safely: welded joints eg fillet lap, tee fillet, close corner, butt; welding position eg flat hand down, horizontal, vertical; 100 mm minimum weld length; forms of material eg plate, section, tube; run welds eg single, multi, stop, restart; edge preparation eg flat, square, bevelled; set up and restrain materials eg position, alignment, gapping, clamps, fixtures; starting the weld eg striking, initiating, torch lighting, adjust/control arc/flame; tack weld; controlling the weld eg speed, direction, angle, blending stops/starts/tacks, distortion, finished appearance
	2.2	Check that the welded joints meet the standards required	<ul style="list-style-type: none"> □ Check that welded joints meet the required standards: dimensional checks eg positional accuracy, size, profile of weld, distortion; visual checks eg uniformity, alignment, correct fusion, fillet of appropriate size, porosity, slag inclusions, parent metal substantially free from arcing or chipping marks
	2.3	Follow correct procedures to close down and safely store welding equipment	<ul style="list-style-type: none"> □ Follow correct procedures to close down and store welding equipment safely: closing down equipment eg isolation of electrical supplies, extinguishing the welding flame, turning off gas cylinders/supply; storing equipment safely eg cables, gas hoses, cylinders, welding sets, filler wires, electrodes, hand tools; returning and storing safety equipment; good housekeeping eg cleaning down, shutting off fume extraction, return of tools and equipment into safe storage

Information for tutors

Delivery

This unit is essentially practical and learners would benefit from practising their skills before being assessed. Learners should think about the processes needed and actions to be taken to prepare their workplace and then weld materials into basic fabrications. Learners should have opportunities to talk about what they are going to carry out and how they propose to overcome problems which may occur whilst they are assembling components. It is important that they understand the safety aspects of working with welding equipment and the measures which must be taken in order to minimise risk. They should also be fully aware of what to do in the case of an emergency.

Outline learning plan

The outline learning plan has been included in this unit as guidance.

Topic and suggested assignments/activities

Confirm with a supervisor what has to be done before welding operations are carried out safely

Tutor-led unit introduction covering content, method of working and assessment.

Tutor-led overview of the welding skills learners will develop.

Tutor-led introduction about how engineers plan the manufacture of basic fabricated structures.

Tutor-led discussion about PPE, where and when it is necessary and how it works.

Tutor-led discussion about the need to confirm proposed activities with a supervisor.

Small-group activity to plan the production of a simple fabricated component.

Prepare a work area ready for the welding of materials

Whole-class, tutor-led discussion about the need to prepare work areas – present examples of poor and good preparation.

Paired activity to identify hazards/bad practices in workshops – presented as images with a checklist to complete.

Check that materials are correct and tools and equipment are safe to use

Whole-class, tutor-led discussion about why welding equipment and materials should be checked before use. Tutor presents a small range of examples which show the consequences of working with equipment and materials that are not fit for purpose.

Small-group activity to identify, from images, unsafe welding practices.

Use appropriate equipment to safely weld materials together

Tutor demonstration of how to use the equipment learners will be working with.

Individual activities to develop welding skills. Simple edge preparation and joint welding using available equipment (oxy-gas and/or electric arc).

Topic and suggested assignments/activities

Check that the welded joints meet the required standards

Whole-class, tutor-led discussion about why welded joints need to be checked for accuracy, distortion and general quality.

Paired activity to check the quality of pre-prepared joints and those that learners have produced.

Follow correct procedures to close down and store welding equipment safely

Tutor-led discussion about the need for 'good housekeeping' in engineering workshops.

Assessment activity – prepare a work area and produce welded joints

Individual activity: set up welding equipment, edge prepare materials, weld joints, carry out checks, close down and put away. The activity should address the unit content and six assessment criteria.

Seek and respond to guidance from their tutor

Tutors should encourage learners to have a dialogue with them. This could be prompted by tutors asking learners to explain what they are doing, why they are doing it and how they are able to work safely. This does not require a formal allocation of time and should occur during delivery and assessment of the unit.

Assessment

The centre will devise and mark the assessment for this unit.

Learners must meet all assessment criteria to pass the unit.

Learners will benefit from access to a range of assessment opportunities. Examples might include observed practice, recorded explanations, checklists and annotated photographic records. Entries within a logbook and weld inspection reports, both validated by the tutor, are also appropriate methods for recording achievement. Competence in practical activities should be evidenced through witness testimonies or observation records signed by the tutor.

Suggested resources

Books

Boyce et al – *Engineering Level 1 Foundation Diploma* (Edexcel/Pearson, 2008)
ISBN 9780435756253

Galvery – *Welding Essentials: Question and Answers* (Industrial Press, 2002)
ISBN 9780831131234

Timings R L – *Basic Manufacturing* (Newnes, 1998) ISBN 9780750659901

Waters F – *Fundamentals of Manufacturing for Engineers* (UCL Press, 1996)
ISBN 9781857283389

Tutor resource disks

Boyce et al – *Engineering Level 1 Foundation Diploma* (Edexcel/Pearson, 2008)
ISBN 9780435756260

Videos

The Video Skill – *Guide to Gas Welding* (1991)

Websites

www.diywelding.co.uk

www.hse.gov.uk

www.mig-welding.co.uk/tutorial.htm

www.twi.co.uk

Unit 7:

Developing Skills in Electronic Assembly

Unit reference number: H/601/0095

QCF level: 1

Credit value: 3

Guided learning hours: 30

Unit aim

This unit introduces learners to the skills needed to assemble electronic components into simple circuits. It will give them the opportunity to think about the precautions and safety requirements needed when using electronic assembly activities. This unit provides some of the knowledge, understanding and skills for the Level 1 Performing Engineering Operations NOS Unit 23: Assembling Electronic Circuits.

Unit introduction

In this unit learners will explore the activities involved in assembling electronic components and making circuits. When preparing for electronic assembly activities they will learn about the necessary safety requirements, components, tools and equipment, and use soldering techniques.

Learners will be involved in the practical activities associated with assembling a simple electronic circuit. They will be able to demonstrate that they can prepare for the activity and also take the necessary precautions to ensure the assembly is carried out safely and correctly. They will have an opportunity to check a range of components, tools and equipment before the circuit is assembled. Having carried out an electronic assembly activity learners will show that they can leave the work area in a safe and tidy condition and that they have produced an assembly to a reasonable standard.

Essential resources

A typical centre engineering workshop should be equipped with the basic requirements of this unit including a range of electronic assembly equipment and components, tools and equipment for assembly operations. All supporting auxiliary equipment should also be available together with appropriate safety equipment.

Workshops should be staffed appropriately to ensure health and safety requirements are met. Technician support may be required during practical work.

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 Be able to prepare for and carry out an electronic assembly activity	1.1	Take precautions ready to carry out an electronic assembly activity	<ul style="list-style-type: none"> □ <i>Preparation activities:</i> precautions eg tidy bench and floor area, planning assembly area layout, checking availability of services such as electrical or air supplies, putting tools and equipment into safe storage after use; preparation eg correct components and how they fit into the assembly, how to use tools and equipment; checking eg bent pins, broken leads, damaged housing, other damage to components, quantity of components □ <i>Electronic assemblies:</i> electronic circuits eg audio amplifiers, signal converters, signal generators, counter/timers, sensor/actuator circuit, digital circuit, signal processing circuit, alarm and protection circuit; connect peripheral components and wiring; assemblies to contain component board including a range of components eg resistor (such as fixed, variable), capacitor (such as fixed, variable, electrolytic), diodes, semiconductor device, integrated circuit IC, connectors, insulators, cables, clips and straps
	1.2	Prepare components, tools and equipment ready for an electronic assembly activity	
	1.3	Check components before they are used in an electronic assembly activity	

Learning outcomes	Assessment criteria		Unit amplification
2 Be able to assemble electronic components correctly and safely.	2.1	List the safety aspects for an electronic assembly activity	<ul style="list-style-type: none"> □ <i>Correct assembly:</i> using pliers, wire strippers, side or end cutters, special tools for inserting components; soldering components and the use of heat sinks/shunts; using anti-static procedures; removing correct length of insulation; avoiding damage to conductors; tinning conductor ends when appropriate; terminating cables to connectors; securing cables using clips and straps; making visual checks eg positioning of components and wiring, damaged/burnt insulation, excessive solder or solder spikes/bridges which may cause short circuits to occur; checking circuit function using simple test equipment and/or specific test tools
	2.2	Produce an electronic assembly correctly and safely.	<ul style="list-style-type: none"> □ <i>Safety:</i> personal protection eg wearing protective clothing, removal of loose clothing and jewellery, use of barrier cream, eye protection, safety footwear; preparation of assembly area; fume extraction; good housekeeping eg cleanliness of work area, removal of waste materials, storage of materials and tools; maintenance of access eg clear walkways, emergency exits; anti-static precautions; heat damage eg use of heat sink; handling circuit boards to avoid contamination; inspecting soldering equipment for damaged/burnt insulation

Information for tutors

Delivery

This unit is about preparing for and carrying out an electronic assembly activity correctly and safely. It therefore lends itself to be delivered in a holistic way and by learners practising in the workshop and reflecting on the experiences gained relating to safety and the correct use of components, tools and equipment when carrying out activities.

A key part of delivery is likely to be demonstration and practice. Although some awareness raising may be needed in a safe environment such as a classroom. Although both learning outcomes are practical in nature, some underpinning knowledge will need to be established before learners are allowed access to the practical activities. Checking of this may be best achieved through question and answer sessions. Other activities such as 'card games' or 'word searches' may also be appropriate and helpful.

Outline learning plan

The outline learning plan has been included in this unit as guidance.

Topic and suggested assignments/activities

Be able to prepare for and carry out an electronic assembly activity

Whole-class, tutor-led discussions about the importance of good preparation.

Whole-class, tutor-led demonstration of good practice and preparation in the electronics workshop.

Individual activity: learners visit a poorly laid out assembly area and establish all points of bad practice, set this up as a competition.

Individual activity: learners devise and play each others' crossword games about the precautions to take and the checking of components.

Assessment of this part of the unit is likely to be achieved within activities to meet the requirement of the second learning.

Be able to assemble electronic components correctly and safely

Individual activity completing 'gapped handouts' about safety aspects etc.

Whole-class, tutor-led demonstration of electronic assembly activities.

Individual learners activity: practise producing electronic assemblies, with formative checks until learners show a reasonable level of competence and safety.

Individual summative assessment activity. This will take a large proportion of the time for this part of the unit.

Assessment

The centre will devise and mark the assessment for this unit.

Learners must meet all assessment criteria to pass the unit.

Due to the nature of the assessment requirements of this unit it is likely that summative assessment will take a large proportion of the 30 hours assigned to the unit. Learners should only be assessed once the tutor is comfortable with their level of competence developed during the formative stages of the practical activities.

A single assignment could be developed to address all the assessment criteria. It should be based on the practical activity of assembling electronic components correctly and safely. This does mean that most of the evidence will be in the form of witness statements/observation records supported by annotated photographs of what learners carried out, and work area layout, along with component listings etc, 2.1 will, however, require either a written list of safety aspects produced by learners or a list written by the tutor and extracted from the learner, and authenticated as such.

The circuit given to each learner must include a range of opportunities for them to take appropriate precautions before they prepare for and start the assembly activity in a correct and safe manner. The electronic assembly must include a range of components to be assembled from those listed in the unit content. Whilst the circuit does not need to contain all those listed it should have a simple function. This would add relevance to this activity. When designing the circuit to be assembled, and components to be used, care must be taken, to ensure that learners have opportunities to demonstrate correct assembly methods as defined in the unit content. It would also be sensible to include some components that are not 'fit for purpose' for example have bent pins, so that learners can demonstrate they have checked components before assembling and requested an exchange. The opportunity to check the assembly for correct function is also important and part of the requirements of 2.2.

Suggested resources

Books

Bishop O – *Electronics: A First Course* (Newnes, 2006) ISBN 0750669608

Bishop O – *Electronics: Circuits and Systems* (Newnes, 2003) ISBN 0750658452

Duncan T – *Success in Electronics* (Hodder Murray, 1997) ISBN 0719572053

Sladdin and Johnson – *Elementary Electronics: Basic Electronics* (Hodder & Arnold, 1990) ISBN 978-0340513736

Tooley M – *Electronic Circuits: Fundamentals and Applications* (Newnes, 2006) ISBN 0750669233

Magazines

Engineering – (*The Engineering Magazine*) ISSN 0013-7782

Engineering & Technology Magazine

Websites

www.maplin.co.uk/

uk.rs-online.com/web/

www.rapidonline.com

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	Be able to prepare for and carry out an electrical wiring activity	1.1	Take precautions ready to carry out an electrical wiring activity	<ul style="list-style-type: none"> □ <i>Preparation activities:</i> precautions eg tidy bench and floor area, planning assembly area layout, checking availability of services such as electrical or air supplies, putting tools and equipment into safe storage after use; preparation eg correct components and cables and how they fit into the assembly, how to use tools and equipment eg electrician's screwdriver (parallel slotted and Phillips head), adjustable wrench, craft knife, pliers with insulated handles, wire strippers, junior hacksaw, digital multimeter, tape measure; checking eg damaged housing, broken insulation, missing terminal screws, quantity of components; preparation for termination activities eg determining the sizes and lengths of required cables □ <i>Wiring electrical activity:</i> wiring a circuit eg lighting, power, control, 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 including earthing procedures and circuit protection; wiring circuit or assembly to contain cabling; simple test to ensure wiring meets the standard eg continuity test, insulation resistance test; making visual checks eg positioning of components, for damaged sleeving, loose and exposed conductors, strain on terminations, insufficient slack cable at sockets
		1.2	Prepare components, cables, tools and equipment ready for an electrical wiring activity	
		1.3	Check components and cables before they are used in an electrical wiring activity	

Learning outcomes	Assessment criteria		Unit amplification
2 Be able to wire and terminate electrical components correctly and safely	2.1	List the safety aspects for an electrical wiring activity	<ul style="list-style-type: none"> □ <i>Electrical circuit or assembly</i>: circuit containing four components eg isolators, switches, sockets, lamp holders, junction boxes/terminal blocks, panel lamps, circuit breakers/fuses, relays/contactors, alarm devices, motors/starters, pumps, heaters, blowers, luminaries, ballast chokes, consumer unit, residual current device (RSD), instruments, transformer, panel/sub-assembly, sensor, actuator, solenoids; positioning and securing of equipment and components; cables eg PVC, flexible, single core, multiway, data/communications, fibre optics, screened/coaxial, ribbon cables, wiring loom/harness; preparing cables eg stripping outer coating without damage to conductor insulation, stripping cable conductor insulation/protection; securing cables eg clips, plastic strapping, lacing, harnessing, clips, protective sleeving, coded tabs; crimping eg spade end, loops, tags, pins; making mechanical/screwed/ clamped connections; soldering and de-soldering; installation eg fixed, as on a wall, portable, as on a bench exercise board or special fixture
	2.2	Wire up electrical components correctly and safely	<ul style="list-style-type: none"> □ <i>Safety</i>: personal protection eg wearing protective clothing, removal of loose clothing and jewellery, use of barrier cream, eye protection, safety footwear; preparation of assembly area; good housekeeping eg cleanliness of work area, removal of waste materials, storage of materials and tools; maintenance of access eg clear walkways, emergency exits; using cable stripping and terminating tools safely and correctly; adhering to safety procedures or systems eg risk assessment, COSHH

Information for tutors

Delivery

This unit is about preparing for and carrying out an electrical wiring activity correctly and safely. It therefore lends itself to be delivered in a holistic way and by learners practising in the workshop and reflecting on the experiences gained relating to safety and the correct use of components, cables, tools and equipment when carrying out these activities.

A key part of delivery is therefore likely to be demonstration and practice although some awareness raising may be needed in a safe environment such as a classroom. Although both learning outcomes are practical in nature, some underpinning knowledge will need to be established before learners are allowed access to the practical activities. Checking of this may be best achieved through question and answer sessions. Other activities such as 'card games' or 'word searches' etc may also be appropriate and helpful.

Outline learning plan

The outline learning plan has been included in this unit as guidance.

Topic and suggested assignments/activities

Be able to prepare for and carry out an electrical wiring activity

Whole-class, tutor-led discussions about the importance of good preparation.

Whole-class, tutor-led demonstration of good practice and preparation in the electrical workshop.

Individual activity: learners visit a poorly laid out wiring or assembly area and establish all points of bad practice, set this up as a competition.

Individual activity: learners devise and play each others' crossword games about the precautions to take and the checking of components and cables.

Assessment of this part of the unit is likely to be achieved within activities to meet the requirements of the second learning outcome.

Be able to wire up electrical components correctly and safely

Individual activity completing 'gapped handouts' about safety aspects etc.

Whole-class, tutor-led demonstration of electrical wiring activities.

Individual activity: learners practise producing electrical wiring assemblies, with formative checks until learners show a reasonable level of competence and safety.

Individual summative assessment activity. This will take a large proportion of the time for this part of the unit.

Assessment

The centre will devise and mark the assessment for this unit.

Learners must meet all assessment criteria to pass the unit.

Due to the nature of the assessment requirements of this unit it is likely that summative assessment will take a large proportion of the 30 hours assigned to the unit. Learners should only be assessed once the tutor is comfortable with their level of competence developed during the formative stages of the practical activities.

A single assignment could be developed to address all the assessment criteria. It should be based on the practical activity of assembling electrical components and cables correctly and safely. This does mean that most of the evidence will be in the form of witness statements/observation records supported by annotated photographs of what learners carried out, and work area layout, along with component and cable listings etc. 2.1 will however require either a written list of safety aspects produced by learners or a list written by the tutor and extracted from the learner, and authenticated as such.

The wiring assembly given to each learner must include a range of opportunities for them to take appropriate precautions before they prepare for and start the assembly activity in a correct and safe manner. The electrical wiring assembly must include four different components and have a cable type from those listed in the unit content. Whilst the circuit does not need to contain all those listed it should have a simple function. Typical circuits are given in the unit content under learning outcome 1. This would add relevance to this activity. When designing the circuit to be assembled, and the components and cables to be carried out used care must be taken to ensure a protection device is included, and that learners have opportunities to show that the assembly is carried out correctly and checked using simple tests and visual checks. It would also be sensible to include some components or cables that are not 'fit for purpose' for example broken insulation, so that learners can demonstrate they have checked components and cables before assembling and requested an exchange. The opportunity to check the wiring for correct function is also important and part of the requirements of 2.2.

Suggested resources

Books

Linsley R – *Basic Electrical Installation Work* (Butterworth-Heinemann, 1998)
ISBN 978-0340705742

Meredith B – *Ortho – Wiring Basics* (Ortho Books, 2000) ISBN 978-0897214407

Magazines

Engineering – (The Engineering Magazine) ISSN 0013-7782

Engineering & Technology Magazine

Websites

www.rapidonline.com

www.maplin.co.uk/

<http://uk.rs-online.com/web/>

Unit 9: Developing Skills in Routine Servicing of Mechanical Equipment

Unit reference number: R/601/0125

QCF level: 1

Credit value: 3

Guided learning hours: 30

Unit aim

This unit introduces learners to the skills needed to carry out the routine servicing of mechanical equipment. It will give them the opportunity to think about the necessary precautions and safety requirements when carrying out a routine service on mechanical systems or equipment by learning about equipment, fluid systems, components and operating mechanisms. This unit provides some of the knowledge, understanding and skills for the Level 1 Performing Engineering Operations NOS Unit 10: Carrying Out Routine Servicing of Mechanical Equipment.

Unit introduction

In this unit learners will explore the activities involved in the routine servicing of mechanical systems or equipment. When carrying out servicing activities they will learn about the necessary safety requirements, and routine servicing equipment, components and systems.

Learners will be involved in the practical activities associated with the routine servicing of a mechanical system or piece of equipment. They will be able to demonstrate that they can prepare for the service, and also take the necessary precautions to ensure the service is carried out safely and correctly. Learners will have an opportunity to make adjustments, such as setting a belt tension, check and fill fluid levels, test and check for leaks and replace components. Having carried out a routine service on a mechanical system or piece of equipment learners will show that they can leave the work area in a safe and tidy condition and that they have carried out the service to a reasonable standard.

Essential resources

A typical centre engineering workshop should be equipped with the basic requirements of this unit including a range of mechanical systems or equipment and components, tools and equipment for servicing operations. All supporting auxiliary equipment should also be available together with appropriate safety equipment.

Workshops should be staffed appropriately to ensure health and safety requirements are met. Technician support may be required during practical work.

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 about routine mechanical servicing operations	1.1	List what to do for the routine servicing of a given mechanical system/equipment	<ul style="list-style-type: none"> □ <i>Mechanical servicing operations:</i> making adjustments to equipment eg adjusting clearances, setting belt tensions, setting operating mechanisms like levers and linkages, setting air line pressures; checking and filling fluid and/or lubrication systems eg topping up oil, fluid or coolant levels, removing excess dirt and grime; making prescribed tests and checks eg checks on self-diagnostic systems, tests for air or fluid leaks, functionality checks; carrying out visual checks eg for damage, excessive wear on belts or chains, leaking seals, contaminated lubricants; changing 'lived' components for example filter lubricants, hydraulic fluids, coolants, seals, gaskets, locking devices; checking all pipework and flexible hoses eg checking pipe joints and connectors are tight and free from damage and leaks; replacing and/or remaking all seals, joints and pipe work which is not serviceable
		1.2	Tell your supervisor what you are going to do when servicing a different given mechanical system/equipment	

Learning outcomes	Assessment criteria		Unit amplification
2 Be able to service mechanical equipment and systems safely.	2.1	Follow safe working practices and procedures when carrying out mechanical servicing operations	<ul style="list-style-type: none"> □ <i>Safe working practices and procedures:</i> making sure equipment is safe to work on eg isolated, out of service and use; wearing protective clothing eg overalls, safety shoes, eye protection, gloves and/or barrier creams; complying with regulations and organisational safety procedures eg permit to work; keeping the work area free of waste materials, surplus materials, tools/equipment; checking that all servicing operations have been completed, all guards and covers have been replaced and there are no oil or fluid leaks
	2.2	Carry out a routine service for a given mechanical system/equipment	<ul style="list-style-type: none"> □ <i>Mechanical equipment and systems:</i> examples of suitable equipment could include pumps, valves, engines, gearboxes, fluid power systems, heating, ventilating and refrigeration systems, drive and control systems/mechanisms; systems including fluids eg lubricants, coolants, hydraulics; non-serviceable components/'lived' components eg belts, filters, gaskets; operating mechanisms eg belts, chains, levers, cams

Information for tutors

Delivery

This unit is about preparing for and carrying out routine mechanical servicing operations correctly and safely. It therefore lends itself to be delivered in a holistic way and by learners practising in the workshop and reflecting on the experiences gained relating to safety and correct adjustments, checking and filling fluid and/or lubrication systems, carrying out prescribed tests and checks, and changing components when carrying out these operations.

A key part of delivery is therefore likely to be demonstration and practice which should be carried out on more than one system or piece of equipment. This is where the major part of the time will be spent during delivery although some awareness raising may be needed in a safe environment such as a classroom. Although the second learning outcome is practical in nature some underpinning knowledge will need to be established before learners are allowed access to the practical activities. This, in fact, is the essence of the first learning outcome which is knowledge based. Further checking of this may be best achieved through question and answer sessions. Other activities such as 'card games' or 'word searches' etc may also be appropriate and helpful.

Outline learning plan

The outline learning plan has been included in this unit as guidance.

Topic and suggested assignments/activities

Know about routine mechanical servicing operations

Whole-class, tutor-led discussions about the importance of good preparation.

Whole-class, tutor-led demonstration of good practice and preparation in the servicing or mechanical workshop.

Individual practice of routine operations, led by the tutor. Individuals work on different servicing operations such as making adjustments, checking and filling fluid and/or lubrication systems, carrying out prescribed tests and checks, and changing components on simple mechanical equipment or systems, such as pumps, valves, engines, gearboxes, fluid power systems, heating, ventilating and refrigeration systems, drive and control systems/mechanisms and systems including fluids.

Individual activity listing what learners carried out, what safety issues arose and the precautions taken etc.

Whole-class discussion on what each individual carried out during the servicing operations.

Individual summative assessment activity – listing what needs to be carried out for a given servicing operation, addressing 1.1.

Assessment 1.2 is likely to be achieved within activities to meet the requirements of the second learning outcome, where learners should be asked what they are going to do when servicing a different given mechanical system/piece of equipment.

Topic and suggested assignments/activities

Be able to service mechanical equipment and systems safely

Individual activity completing 'gapped handouts' about safety aspects etc.

Further whole-class, tutor-led demonstration of the routine servicing of mechanical systems/equipment.

Further individual activity, practising servicing mechanical systems/equipment, with formative checks until learners show a reasonable level of competence and safety.

Individual summative assessment activity. This will take a large proportion of the time for this part of this learning outcome.

Assessment

The centre will devise and mark the assessment for this unit.

Learners must meet all assessment criteria to pass the unit.

Due to the nature of the assessment requirements of this unit it is likely that the summative assessment will take a large proportion of the time assigned to the unit. Learners should only be assessed once the tutor is comfortable with their level of competence developed during the formative stages of the practical activities.

Two assignments could be developed to address the assessment criteria. The first assignment could address 1.1 as a stand-alone activity listing what to carry out for the routine service of given mechanical system/equipment. The second assignment should be based on the practical activity of routine servicing a mechanical system or piece of equipment correctly and safely. The given mechanical system or equipment must be different to that given for 1.1. This does mean that most of the evidence for 2.1 and 2.2 will be in the form of witness statements/observation records supported by annotated photographs of what learners carried out and work area layout and system or equipment serviced, along with notes, servicing logs or listings etc 1.2 will also require a statement about what learners said during the activity, and authenticated as such.

The routine service allocated to each learner must include a range of opportunities for them to take appropriate precautions before they prepare for and start the service activity in a correct and safe manner. The mechanical system/equipment must enable learners to make adjustments, check and fill fluid and/or a lubrication system, carry out prescribed tests and checks, including visual checks, change 'lifer' components, and check all pipework and flexible hoses. Typical systems and equipment are given in the unit content under learning outcome 2. This would add relevance to this activity. When designating the service to be carried out care must be taken to ensure a non-serviceable component is included, and that learners have opportunities to show that the service is carried out correctly, checked and returned to use.

Suggested resources

Books

Mobley R K – *Maintenance Fundamentals* (Butterworth-Heinemann, 2004)
ISBN 978-0750677981

Salmon D – *NVQ Engineering Level 2 Mechanical Units* (Longman, 1998)
ISBN 978-0582302990

Salmon, Powdril – *Mechanical Engineering: Level 2 NVQ: Performing Engineering Operations* (Newnes, 2002) ISBN 978-0750654067

The following are examples of materials that support understanding of more complex equipment and systems.

Dixon G – *Dishwasher Manual: DIY Plumbing, Fault-finding, Repair and Maintenance* (Hardcover) (Haynes, 2009) ISBN 978-1844255559

Dixon G – *The Washing Machine Manual: DIY Plumbing, Fault-finding, Repair and Maintenance* (Hardcover) (Haynes, 2007) ISBN 978-1844253487

Magazines

Engineering – (*The Engineering Magazine*) ISSN 0013-7782

Engineering & Technology Magazine

Other publications

Manufacturers' manuals and data sheets

Unit 10: Developing Skills in Routine Servicing of an Electrical/Electronic System

Unit reference number: D/601/0127

QCF level: 1

Credit value: 3

Guided learning hours: 30

Unit aim

This unit introduces learners to the skills needed to carry out routine servicing of electrical/electronic systems. It will give them the opportunity to think about the necessary precautions and safety requirements when carrying out a routine service on electrical or electronic systems or equipment by learning about equipment, routine tests and checks, and components. This unit provides some of the knowledge, understanding and skills for the Level 1 Performing Engineering Operations NOS Unit 24: Carrying Out Routine Servicing on Electrical Electronic Equipment.

Unit introduction

In this unit learners will explore the activities involved in the routine servicing of electrical or electronic systems or equipment. When carrying out servicing activities they will learn about the necessary safety requirements, and routine servicing equipment, components and systems.

Learners will be involved in the practical activities associated in the routine servicing of electrical/electronic system or/and equipment. They will be able to demonstrate that they can carry out prepare for the service also take the necessary precautions to ensure the service is carried out safely and correctly. Learners will have an opportunity to carry out routine tests and checks, including visual checks on power leads or extension cables, and to replace components. Having carried out a routine service on an electrical/electronic system or piece of equipment learners will show that they can leave the work area in a safe and tidy situation and that they have carried out the service to a reasonable standard.

Essential resources

A typical centre engineering workshop should be equipped with the basic requirements of this unit including a range of mechanical systems or equipment and components, tools and equipment for servicing operations. All supporting auxiliary equipment should also be available together with appropriate safety equipment.

Workshops should be staffed appropriately to ensure health and safety requirements are met. Technician support may be required during practical work.

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 about routine electrical/electronic servicing operations	1.1	List what to do for the routine servicing of a given electrical/electronic system/equipment	<ul style="list-style-type: none"> □ <i>Electrical/electronic servicing operations</i>: carrying out routine tests and checks eg carrying out tests on portable tools and equipment, instrumentation, sensors or indicators, carrying out checks on self-diagnostic systems, carrying out tests for correct earthing, insulation resistance and operation of alarm and protection equipment; checking and/or changing 'lived' components eg equipment and/or emergency back up batteries, commutator brushes, overload protection devices, panel/warning lights, checking building and emergency lighting systems and changing lamps or tubes as appropriate; carrying out visual checks eg cuts or damage to cables, cracked, broken or loose plugs and/or connectors, excessive arcing of switches or contactors, overheating or damage to circuit board components, impact damage to casings, entry of water or foreign bodies; removing excessive dirt and grit; making adjustments to components, connections or fastenings
		1.2	Tell your supervisor what you are going to do when servicing a different given electrical/electronic system/equipment	

Learning outcomes	Assessment criteria		Unit amplification
2 Be able to service electrical/electronic equipment and systems safely	2.1	Follow safe working practices and procedures when carrying out electrical/electronic servicing operations	<ul style="list-style-type: none"> □ <i>Safe working practices and procedures:</i> wearing protective clothing and equipment; complying with regulations and organisational safety procedures eg adhering to risk assessments and COSHH regulations, permit to work procedures, taking anti-static precautions; keeping the work area clean and tidy and in a safe condition; ensuring equipment isolation from electrical supply and that access has been provided; checking that all servicing operations have been completed and the service area is free of tools used and excess materials, all covers have been replaced and, where appropriate, that power has been restored
	2.2	Carry out a routine service for a given electrical/electronic system/equipment	<ul style="list-style-type: none"> □ <i>Electrical/electronic equipment and systems:</i> examples could include portable power tools, test equipment, low voltage lighting systems, heating or ventilating systems, switchgear and distribution panels, motors and starters, alarm and protection equipment/circuits, electrical plant, wiring enclosures, control systems and components, luminaires; systems including power leads or extension cables; non-serviceable components/'lived' components eg batteries, lights, switches, sockets, plugs/connectors, circuit board, fuses/overload protection devices

Information for tutors

Delivery

This unit is about preparing for and carrying out routine electrical/electronic servicing operations correctly and safely. It therefore lends itself to be delivered in a holistic way and learners by practising in the workshop and reflecting on the experiences gained relating to safety, carrying out prescribed tests and checks and changing components when carrying out these operations.

A key part of delivery is therefore likely to be demonstration and practice which should be carried out on more than one system or piece of equipment. This is where the major part of the time will be spent during delivery although some awareness raising may be needed in a safe environment such as a classroom. Although the second learning outcome is of practical in nature some underpinning knowledge will need to be established before learners are allowed access to the practical activities. This, in fact, is the essence of the first learning outcome which is knowledge based. Further checking of this may be best achieved through question and answer sessions. Other activities such as 'card games' or 'word searches' etc may also be appropriate and helpful.

Outline learning plan

The outline learning plan has been included in this unit as guidance.

Topic and suggested assignments/activities

Know about routine electrical/electronic servicing operations

Whole-class, tutor-led discussions about the importance of good preparation.

Whole-class, tutor-led demonstration of good practice and preparation in the servicing or electrical/electronic workshop.

Individual practice of routine operations, led by the tutors, individuals working on different servicing operations such as carrying out routine tests and checks and changing components on simple electrical/electronic equipment or systems, such as portable power tools, test equipment, low voltage lighting systems, heating or ventilating systems including power leads or extension cables.

Individual activity listing what learners carried out what safety issues arose and the precautions taken etc.

Whole-class discussion on what each individual carried out during the servicing operations they carried out.

Individual summative assessment activity involving the listing of what was carried out for a given servicing operation addressing 1.1.

Assessment 1.2 is likely to be achieved within activities to meet the requirements of the second learning outcome where learners should be asked what they are going to carry out when servicing a different given electrical/electronic system/ piece of equipment.

Topic and suggested assignments/activities

Be able to service electrical/electronic equipment and systems safely

Individual activity completing 'gapped handouts' about safety aspects etc.

Further whole-class, tutor-led demonstration of the routine servicing of electrical/electronic systems/equipment.

Further individual activity, learners practise servicing of electrical/electronic systems/equipment, with formative checks until learners show a reasonable level of competence and safety.

Individual summative assessment activity. This will take a large proportion of the time for this part of this learning outcome.

Assessment

The centre will devise and mark the assessment for this unit.

Learners must meet all assessment criteria to pass the unit.

Due to the nature of the assessment requirements of this unit it is likely that summative assessment will take a large proportion of the 31 hours assigned to the unit. Learners should only be assessed once the tutor is comfortable with their level of competence developed during the formative stages of the practical activities.

Two assignments could be developed to address the assessment criteria. The first assignment could address 1.1 as a stand-alone activity listing what to carry out for a routine service of a given electrical/electronic system/equipment. The second assignment should be based on the practical activity routine servicing an electrical or electronic system or piece of equipment correctly and safely. The given electrical/electronic system or equipment must be different to that given for 1.1. This does mean that most of the evidence for 2.1 and 2.2 will be in the form of witness statements/observation records supported by annotated photographs of what learners carried out, and work area layout and system or equipment serviced, along with notes, servicing logs or listings etc, 1.2 will also require a statement of what the learner said during the activity, and authenticated as such.

The routine service given to each learner must include a range of opportunities for them to take appropriate precautions before they prepare for and start the service activity in a correct and safe manner. The electrical/electronic system/equipment given must include an opportunity for learners to carry out routine tests and checks, including visual checks on power leads or extension cables, and change 'lived' components. Typical systems and equipment are given in the unit content under learning outcome 2. This would add relevance to this activity. When designating the service to be carried out care must be taken to ensure a non-serviceable component is included, and learners have opportunities to show that the service is carried out correctly, checked and returned to use.

Suggested resources

Books

Anderson J S – *Electronics Servicing* (Butterworth-Heinemann, 1997)
ISBN 978-0750635547

Bishop O – *Getting Started in Practical Electronics* (Babani Publishing, 1994)
ISBN 978-0859343459

Dixon G – *Dishwasher Manual: DIY Plumbing, Fault-finding, Repair and Maintenance* (Hardcover) (Haynes, 2009) ISBN 978-1844255559

Dixon G – *The Electrical Appliance Manual* (Haynes, 2000) ISBN 978-1859608005

Dixon G – *The Washing Machine Manual: DIY Plumbing, Fault-finding, Repair and Maintenance* (Hardcover) (Haynes, 2007) ISBN 978-1844253487

Sinclair I – *Electronic and Electrical Servicing: Consumer and Commercial Electronics* (Paperback) (Newnes, 2007) ISBN 978-0750669887

Sinclair I and Lewis G – *Electronic and Electrical Servicing: Level 2: Consumer and Commercial Electronics Core Units Level 2* (Newnes, 2002) ISBN 978-0750654234

The following are examples of materials that support understanding of more complex equipment and systems.

Magazines

Engineering – (The Engineering Magazine) ISSN 0013-7782

Engineering & Technology Magazine

Other publications

Manufacturers' manuals and data sheets

The following SEMTA publications may not be available for purchase but are still a useful resource.

SEMTA – *Instructors Manual, Training Module for Maintaining Electrical Equipment and Systems* (Training Publications Ltd 2001)

SEMTA – *Trainees Book, Training Module for Maintaining Electrical Equipment and Systems* (Training Publications Ltd 2001)

Unit 11: Starting Work in Engineering

Unit reference number: L/503/3425

QCF level: 1

Credit value: 4

Guided learning hours: 40

Unit aim

This unit introduces learners to career opportunities in engineering and the organisations that provide these opportunities. It encourages learners to make informed choices about their potential career options.

Unit introduction

This unit introduces learners to the different specialist areas that make up the engineering sector and helps learners identify the various careers available in each of these specialist areas, at all levels.

Learners will have the opportunity to explore the different types of organisation that operate within the engineering sector in terms of their size and the type of work they undertake. Learners will use this information to make decisions concerning possible career choices in engineering, and to reflect on the effect of these choices on their preferred lifestyle.

Although learners will work independently when making decisions about their career options, they will also function as effective members of a team by working responsibly and cooperatively with others.

When preparing for work in the engineering industry it is important that learners are able to seek, and respond to, guidance from colleagues and tutors during the learning process. This unit will help learners to develop an understanding of the personal qualities that employers value.

Essential resources

People working in the engineering sector are likely to be a very useful resource to motivate and inspire learners. Centres are encouraged to invite external speakers to talk about their experiences of companies and work. Paper-based information such as directories of organisations, job descriptions and job adverts from newspapers are all sources of useful information for learners.

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 about the different types of career opportunities available in engineering	1.1	Describe the different types of career opportunities in engineering	<ul style="list-style-type: none"> □ <i>Types of career opportunity:</i> fulltime or part-time; employed or self-employed; permanent or temporary; professional and technical eg design engineer, production management, development engineer, maintenance management, facilities management; craft or operative eg machinist, fitter, CAD operator; skilled or unskilled
2	Know about the different types of organisation offering career opportunities in engineering	2.1	Describe the different types of organisation that offer career opportunities in engineering in terms of their size and the nature of the work they undertake	<ul style="list-style-type: none"> □ <i>Types:</i> small businesses eg start-up companies, sole traders; large privately or publicly owned organisations eg partnerships, limited companies/PLCs, multi-nationals □ <i>Work undertaken:</i> manufacturing, servicing, contractors eg private businesses and public sector
3	Understand how career choices can impact on an individual's lifestyle	3.1	Explain how an individual's lifestyle may be influenced by their career choices they make	<ul style="list-style-type: none"> □ <i>Lifestyle issues:</i> ambitions and aspirations; job satisfaction; sense of identity; financial and social benefits □ <i>Impact of career choice:</i> requirements eg education, training and development, robust mental and physical health; conditions of work eg hard work, tight deadlines, working away from home or abroad, weekend working, flexitime, long hours of work, time spent travelling to work; impact eg effect on family life, social life and personal relationships, stress levels, mental and physical demands

Learning outcomes		Assessment criteria		Unit amplification
4	Be able to make informed career choices	4.1	Make realistic career choices based on provided information	<ul style="list-style-type: none"> □ <i>Career choices:</i> career choice from learning outcome 1 above, potential employers from content learning outcome 2 above, implications of career choice from learning outcome 3 above □ <i>Behaviour:</i> eg responsibility, recognition of strengths, knowledge and understanding of self and other team members, cooperation □ <i>Attitudes:</i> eg enthusiasm; approachability; communication skills eg listening, questioning, speaking clearly; following instructions
	Be able to work responsibly with others	5.1	Demonstrate good team working skills by working responsibly and cooperatively	
6	Be able to seek, and respond to, guidance when working as part of a team	6.1	Follow instructions when working with others	
		6.2	Communicate appropriately with others	

Information for tutors

Delivery

The purpose of this unit is to encourage learners to think realistically about what it would be like to work in engineering and, more particularly, to help learners match their skills, qualities and aspirations to a job they feel they might want to do. The unit describes a wide range of jobs at all levels but delivery should focus on those jobs learners could access upon completion of a programme based on Level 1 units. Progression issues should be examined by consideration of the ambitions of individual learners and by matching these ambitions to further training and development opportunities.

The unit is designed to provide an overview of the work available in the engineering sector, starting with the range of available jobs, their skill requirements and the different types of organisation that employ people to perform these jobs and offer good training and employment opportunities. In this unit the learners only need to consider job roles and responsibilities in the broadest sense. This could include the difference between craft and technician roles, engineering craft or technical apprenticeships, together with examples of the above.

Learners should be made aware that whilst there are large organisations which dominate the industry, much of the UK engineering sector is made up of smaller organisations which prevail. The reasons why people must work together as a team to plan, design and make products, artifacts and components should be stressed throughout. The unit gives learners the opportunity to think about factors that affect job choice from a variety of perspectives including:

- their personal skills and qualities
- the skills and qualities they might wish to acquire
- the different types of organisation in the engineering sector
- the needs and wants of different organisations in terms of work undertaken, physical location, size and structure
- how a job could affect their lifestyle
- how their lifestyle might have to change
- the relationship between lifestyles and job choices.

Outline learning plan

The outline learning plan has been included in this unit as guidance.

Topic and suggested assignments/activities

Know about the different types of career opportunities available in engineering

Whole-class, tutor-led discussions supported by small-group research into the different types of career opportunities available, followed by group presentations of their findings. Source material to include books, CD ROMs, newspapers, trade magazines and the internet. Presentations by experienced engineering personnel will be useful.

Know about the different types of organisation offering career opportunities in engineering

Whole-class, tutor-led discussions supported by small-group research into the different types of organisation working in engineering, followed by group presentations of their findings. Source material to include newspapers, trade magazines and the internet. Presentations by representatives from these organisations will be useful.

Understand how career choices can impact upon an individual's lifestyle

Whole-class, tutor-led, discussions with a question and answer session to draw out learners' thoughts on the potential personal impact of several different career choices at both professional/technical and craft/operative level. Presentations by experienced engineering personnel on the personal advantages and disadvantages of their career choices will be useful.

Be able to make informed career choices

Career choices must be based on the information gathered above and should be realistic and coherent. Evidence should take the form of clear choice of career(s), identification of at least one organisation that offers these careers and evidence that learners have investigated the impact of their career choice on their preferred lifestyle.

Be able to work responsibly with others

Discussion of the benefits of behaving in a cooperative and responsible manner towards staff and other learners. This does not require a formal allocation of time and should occur during both delivery and assessment.

Be able to seek and respond to guidance when working as part of a team

Tutors should encourage learners to ask questions about their work. This could be prompted by tutors asking learners to explain as they work what they are doing, why they are doing it, the nature of the careers they are contemplating and the potential impact of these careers on their preferred lifestyle. Learners should be aware that their attitude, and the nature of their response to any advice, will comprise part of the evidence required to achieve the unit. This does not require a formal allocation of time and should occur during delivery and assessment.

Assessment

The centre will devise and mark the assessment for this unit.

Learners must meet all assessment criteria to pass the unit.

The use of one assessment instrument is suggested as being sufficient to allow full coverage of the learning outcomes, although assessment may be conducted in two discrete parts to avoid assessment overload for learners. The assessment instrument would therefore comprise all assessment criteria. Assessment could be divided into two parts: firstly 1.1 and 2.1 and, secondly, 3.1 and 4.1. 5.1, 6.1 and 6.2 can be assessed over the whole period of assessment and will not require extra time.

For 1.1, learners must describe two different types of career opportunities in engineering in terms of the skills and abilities needed. One career should relate to professional and technical opportunities and the other should relate to craft and operative job opportunities. A highly detailed answer is not required but the two types of job role must be clearly differentiated.

For 2.1, learners must describe two different types of organisation that offer career opportunities in engineering in terms of their size and the nature of the work they undertake. One organisation should be a large organisation engaged in major engineering projects and the other a small or medium enterprise (SME) engaged in smaller engineering projects. A highly detailed answer is not required but the two types of organisation, and the nature of their work, must be clearly differentiated.

For 3.1, learners must explain how an individual's lifestyle may be influenced by their career choices, in terms of the training and development they will need, their general state of health, the conditions under which they will work, the possible effect on their personal relationships and the general demands of the chosen career. The treatment can be broad as learners do not need to make a career or job choice at this point.

For 4.1, learners must make two realistic career choices. This does not need to relate to their own desired career path as it is unlikely that this will be clear to learners at this stage. Learners must demonstrate the ability to make career choices based on information provided by their tutor. This information should relate to the training and development needed for a range of different jobs and the nature of the different organisations they might work for. As for 1.1 above, a highly detailed answer is not required but learner choices should be essentially correct and clearly differentiated from each other.

For 5.1, learners must demonstrate good teamworking skills by working in a responsible and co-operative manner and by sharing resources and ideas with other learners. They must however produce their own individual evidence which could take the form of a witness statement or observation record.

For 6.1 and 6.2, learners must demonstrate responsibility by seeking and listening to guidance and clarification from tutors, as and when appropriate, and by acting on the guidance received. They should communicate appropriately with both tutors and other learners at all times. Evidence again could take the form of a witness statement or observation record.

Suggested resources

Books

A wealth of careers information exists, much of it of a local nature. School, college and public libraries will have useful material and trade magazines, local and regional newspapers which will all help learners to assess the job market at any given time.

Basta N – *Opportunities in Engineering Careers, Rev. Ed.* (Opportunities In! Series) (McGraw-Hill Professional; 2nd edition, 2002) ISBN 978-0071390460

Echaore-McDavid & McDavid – *Career Opportunities in Engineering* (Career Opportunities) (Facts On File Inc, 2007) ISBN 978-0816061525

Garner G – *Careers in Engineering* (McGraw-Hill Contemporary, 2008) ISBN 978-0071545556

Magazines

Engineering – (The Engineering Magazine) ISSN 0013-7782

Engineering & Technology Magazine

Websites

www.direct.gov.uk/en/YoungPeople/index.htm

www.scenta.co.uk/engineering.cfm

www.semta.org.uk

www.summitskills.org.uk

www.thecareerengineer.com

www.yourcareerguide.co.uk/engineer.asp

Unit 12:

Searching for a Job

Unit reference number: L/501/5958

QCF level: 1

Credit value: 1

Guided learning hours: 10

Unit aim

Looking for a job can be challenging and time consuming. Before starting the search, it is important to know what skills you have, what you are interested in and where to look for appropriate employment opportunities. The focus of this unit is for learners to demonstrate their skills in knowing where and how they can identify potential jobs most effectively. Learners will find out how to choose the most appropriate ways to search for jobs and the most appropriate jobs to search for, based on an understanding of their own skills and interests.

Essential resources

Learners will need access to sources of information about where and how to search for specific types of jobs (such as magazines, newspapers, the internet, other people, Jobcentres). They will also need access to examples of relevant job advertisements (real or simulated).

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 potential job sources	1.1	Describe different types of sources of employment available for job-seekers	<ul style="list-style-type: none"> □ <i>Potential job sources:</i> eg job centres, recruitment agencies, local community noticeboards, advertisements inside or outside shops, offices, restaurants or other places of work, local newspapers and other local publications, national press, internet, self-employment, HR departments of organisations/companies, word of mouth
		1.2	Describe the roles/functions of these sources	<ul style="list-style-type: none"> □ <i>Roles/functions of different job sources:</i> sources which provide a recruitment service to employers and jobseekers eg employment agencies, job centres; sources which recruit directly for an organisation/company eg HR departments, company websites; sources which provide advertisements or other information about potential job opportunities eg community noticeboards, newspapers
2	Know potential job roles related to their skills and interests	2.1	Match their skills and interests to potential job roles	<ul style="list-style-type: none"> □ <i>Skills and interests:</i> `hard` skills gained through eg completing a training course or through education or previous work experience; `soft` skills eg personal qualities and talents, interests eg hobbies, preferences and aspirations □ <i>Matching to potential job roles:</i> the potential job role should ideally match the learner's `hard` and `soft` skills; important and less important factors in deciding the appropriateness of a potential job role eg location, working hours, salary, job description, type of industry, size of organisation

Learning outcomes	Assessment criteria		Unit amplification
3 Be able to search for job vacancies.	3.1	Understand the layout and format of job adverts in relation to their personal circumstances	<ul style="list-style-type: none"> □ <i>Layout and format of job adverts:</i> relevant terminology such as abbreviations and descriptors commonly used in job adverts eg 'CV', 'MD', 'O.T.E', 'PA', 'team player', 'hands-on approach', 'flexible attitude'; different types of information contained in a job advert eg location, skills needed for the job, salary and benefits, length of contract, opportunities to receive training, promotion or learn new skills; recognising key words in job adverts that match own skills, interests and personal circumstances eg 'would suit someone with an interest in sport', 'full driving licence required'
	3.2	Identify sources of information available for carrying out job searches	<ul style="list-style-type: none"> □ <i>Sources for job searches:</i> there are a range of different sources which provide information on job vacancies eg recruitment agencies, internet sites, newspapers, magazines and journals, jobcentres; different sources carry different types of job adverts eg trade journals carry job adverts specific to a particular sector or industry
	3.3	Select appropriate methods to search for particular job vacancies.	<ul style="list-style-type: none"> □ <i>Appropriate methods to search for jobs:</i> conducting the job search according to what learners require from a job eg using local sources such as local newspapers, Jobcentres, neighbours and friends to search for jobs in the local area, searching the vacancies section of a company or organisations website if the learner wishes to work for that particular company or organisations, using internet job sites or national newspapers if the learner wishes to find a job outside their local area

Information for tutors

Delivery

A wide range of delivery methods may be used in this unit, including tutorials, presentations, videos, discussions with those in the world of work, worksheets and internet sources. As many practical activities as possible should be included to help learners relate to the unit content.

By combining various aspects of the unit, tutors should be able to cover all the learning outcomes through practical activities.

As the emphasis of this unit is on allowing the learner to identify potential jobs, based on an understanding of their own skills and interests, the tutor could start delivery of this unit by asking learners to make a list of jobs that interest them.

Learners should be encouraged to describe their skills and interests through group discussion or with a tutor. In describing their skills and interests, they should understand how these can be used to identify potential job roles – this could be related to the type of job they are interested in (for example administration, customer service) or specifically to a sector area (for example health and social care, construction, retail) and the particular features of individual job roles such as working hours, work location etc. The learner's skills and interests may also be related to other qualifications they are undertaking which may help to identify potential job roles.

To develop knowledge of potential job sources, learners should investigate the range of job sources available to them. These could be job agencies such as employment agencies or Jobcentres, services such as careers advisers, or sources of information such as newspapers, trade journals and internet sites. Learners should also know that some job vacancies can be brought to their attention by other means such as word of mouth.

Learners could visit the Jobcentre or an employment agency. On returning to the college, school or place of learning, learners could record their information about the roles and functions of these services and potential jobs to suit their skills, abilities and interests.

In order to identify appropriate job roles, learners could carry out further directed investigation into potential job roles, for example by reading about potential areas of work on the internet or in careers publications, or by talking to people who work in a similar area.

For learning outcome 3, learners could work in groups to analyse the information in real job adverts and answer questions on a worksheet about the key words and terminology used.

Assessment

The centre will devise and mark the assessment for this unit.

Learners must meet all assessment criteria to pass the unit.

To achieve 1.1, the learner must describe clearly four different sources of job vacancies. This could take the form of a presentation, leaflet or poster which includes the information required for 1.2.

To meet 1.2, the learner needs to give clear, detailed information about what the four different job sources described in 1.1 do or what type of service they provide.

To achieve 2.1, the learner will need to identify their own 'hard' and 'soft' skills, and match these skills to two potential job roles. Learners should be able to select the most appropriate job roles based on how closely they match their skills and interests. This information could be presented in the form of a chart or checklist.

For 3.1, the learner needs to identify information in job adverts which will help them in carrying out a job search to match their skills and interests, for example how the skills requirements section of a job advert can help them to narrow down their search.

The learner may use either job vacancies for which they will be applying or in which they have a genuine interest.

To achieve 3.2, the learner needs to identify three sources of information available to search for potential jobs (although they will not be expected to use all of these to search for potential jobs). Tutors may wish to give learners a range of appropriate sources to choose from at this level.

For 3.3, the learner needs to identify two methods which are appropriate to search for two potential jobs.

Links to other BTEC units, other BTEC qualifications and other relevant units and qualifications

This unit forms part of the *WorkSkills from Edexcel* suite. This unit has particular links with:

Entry Level	Level 1	Level 2
Unit 5: Searching for a Job	Unit 6: Applying for a Job	Unit 4: Searching for a Job
Unit 6: Applying for a Job	Unit 7: Preparing for an Interview	Unit 5: Applying for a Job
Unit 7: Preparing for an Interview	Unit 8: Interview Skills	Unit 6: Preparing for an Interview
Unit 8: Interview Skills	Unit 11: Career Progression	Unit 7: Interview Skills
Unit 11: Career Progression		Unit 10: Career Progression

Suggested resources

Websites

www.direct.gov.uk/en/Employment

www.learndirect.co.uk

www.monster.co.uk

www.yourcareerguide.co.uk/engineer.asp

Unit 13:

Applying for a Job

Unit reference number: Y/501/5848

QCF level: 1

Credit value: 1

Guided learning hours: 10

Unit aim

The various methods of applying for a job differ in their requirements and the type of information requested of the applicant. The focus of this unit is for learners to understand how to apply for a range of job vacancies but they will only need to actually apply for one job to achieve the unit. Learners will gain an understanding of how and when different types of methods are used for applying for employment. They will find out how to gather the relevant information to support a job application and will also look at the importance of presenting job application information in an appropriate and accurate way.

Essential resources

Learners will need access to examples of real or simulated job application forms and examples of other job application documents such as CVs and covering letters.

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 different methods of applying for jobs	1.1	Describe different methods of applying for a job	<ul style="list-style-type: none"> □ <i>Different methods of applying:</i> different formats for applications eg application forms, CVs, covering letters, applications via a website, applying in person; method of applying may be linked to the type of job eg requirement to provide covering letter may suggest job role requires good communication or written skills, use of online application form may suggest job role requires basic computer skills
		1.2	Describe how and when different methods of applying for a job are used	
2	Know how to complete a job application form	2.1	Identify the information needed to prepare the job application form	<ul style="list-style-type: none"> □ <i>Requirements for job application:</i> different types of information needed for a job application eg personal details, skills, previous work experience, education and training; knowing which items of personal information to include and what to leave out eg age, gender, address, telephone number; knowing whether you are eligible to work in the country legally; recognising that certain items of information fit certain parts of the job application form; using templates and examples as a guideline
		2.2	Assemble the relevant information for the job application form	
3	Be able to apply for a job using the appropriate method	3.1	Describe the conventions, formats and styles of presenting information in job applications (for either real or simulated job application)	<ul style="list-style-type: none"> □ <i>Apply for a job using an appropriate method:</i> including only relevant and appropriate information; following accepted guidelines for the format and content of a CV, following accepted guidelines for the format and content of a covering letter
		3.2	Present the job application information accurately and in a suitable format	

Information for tutors

Delivery

The unit has been designed to make delivery of the key topics practically based wherever possible.

The tutor could start delivery of this unit by providing a range of job application forms and CV templates of a suitable level for learners working at level 1. Learners could work in groups to think about the information they will need to prepare to be able to complete them. Alternatively, learners could collect different application forms for different jobs. They could telephone, email or write to request the forms.

Examples of covering letters could be provided. Learners could work in groups to produce a checklist of the information to be provided in a covering letter.

As part of learning outcome 1, a question and answer session could determine reasons why different methods of applying for job are used. For example, some employers will want to see more of a learner's ability to express themselves in writing hence a request for a CV and covering letter, whilst other employers will simply need to see the learner's experience to date with some writing on an application form.

Reasons raised in the question and answer session could be collated on a board/flipchart.

For learning outcome 2, learners could work independently to collect the information required to complete a job application. The job application may be real or simulated, and can either have been chosen by the learner or given to them. However, the learner and the tutor must discuss and agree that this is a suitable job based on the learner's skills and interests, so that the application is relevant to them.

Learners may be given a CV template and a template for a covering letter into which they can put their personal information.

Guest speakers could be invited to speak to learners about the importance of correctly presenting information on applications forms, CVs and covering letters and correctly following specific instructions.

Learners should be encouraged to practise presenting applications appropriately and discuss with their tutor any concerns they may have so that they are able to present documents in a format which is suitable for the employer. They should also be encouraged to proofread their job applications for accuracy, using resources such as a spellchecker, peers or friends.

Assessment

The centre will devise and mark the assessment for this unit.

Learners must meet all assessment criteria to pass the unit.

To achieve 1.1, the learner needs to give clear details about two different ways to apply for a job.

For 1.2, the learner will need to explain how and when each of the two different ways to apply for a job (described in 1.1) are used.

For 2.1, the learner should identify the information they need in order to prepare their job application form or for use in a CV with covering letter. The learner may receive guidance in finding the relevant information but must be able to extract it independently.

For 2.2, the learner will need to allocate the identified information to the appropriate part of the job application document or documents. They may discuss and agree with the tutor how best to use the identified information. However, the learner must subsequently be able to make their own decisions regarding how to use the information in their job application. The learner at this level may use a CV template into which they can put their personal information. They may also use a template for a covering letter, but must show independence in being able to fill in the sections correctly.

For 3.1, the learner will need to describe the usual way of presenting information so that it is legible, concise, clearly understood by the employer and follows specific instructions given in the job application method.

To achieve 3.2, the job application should be presented accurately with care and attention paid to correct spelling, grammar (and legibility of handwriting if used). Where information is submitted electronically, learners should be familiar with the use of formatting and the spellchecker. The final application document should show that the learner understands the importance of using relevant information when filling in application documentation. If a covering letter is included, it should cover the relevant aspects of the job such as why the learner is applying and how they meet the criteria of the job description.

Links to other BTEC units, other BTEC qualifications and other relevant units and qualifications

This unit forms part of the *WorkSkills from Edexcel* suite. This unit has particular links with:

Entry Level	Level 1	Level 2
Unit 5: Searching for a Job	Unit 5: Searching for a Job	Unit 4: Searching for a Job
Unit 6: Applying for a Job	Unit 7: Preparing for an Interview	Unit 5: Applying for a Job,
Unit 7: Preparing for an Interview	Unit 8: Interview Skills	Unit 6: Preparing for an Interview
Unit 8: Interview Skills	Unit 11: Career Progression	Unit 7: Interview Skills
Unit 11: Career Progression		Unit 10: Career Progression

Suggested resources

Websites

www.direct.gov.uk/en/Employment/Jobseekers/LookingForWork

www.direct.gov.uk/en/YoungPeople/Workandcareers/Gettingyourfirstjob

www.open.ac.uk/careers/applying-for-jobs.php

www.worksmart.org.uk/career/job_advertisements

Unit 14: Preparing for an Interview

Unit reference number: M/501/5824

QCF level: 1

Credit value: 1

Guided learning hours: 10

Unit aim

Preparation and planning are vital aspects of the interview process and go a long way towards improving the chances of a successful outcome. In this unit, learners will develop the skills of planning appropriate questions to ask an interviewer as well as preparing responses to likely questions ahead of an interview. They will also look at how to make effective travel plans for an interview to help them arrive at the correct time and place.

Essential resources

In order to prepare for an interview, learners will need a given brief for an appropriate job, placement or place on a training course.

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 how to respond to questions they might be asked at the interview	1.1	Prepare answers to questions they might be asked at the interview	<ul style="list-style-type: none"> □ <i>Purpose of the interview:</i> eg for employment, a course, work placement, volunteering □ <i>Respond to questions:</i> eg ensure they understand the question before they answer, ensure answers are appropriate and clear, how to respond when they don't know the answer to a question □ <i>Questions they might be asked:</i> which questions are most likely to be asked; not all questions can be planned for ahead of time
2	Be able to prepare appropriate questions to ask the interviewer	2.1	Identify questions to ask which show their interest in the job, placement or course	<ul style="list-style-type: none"> □ <i>Prepare appropriate questions to ask the interviewer:</i> questions should use appropriate language register; content of questions should be relevant to the course/placement/job; learner shows their interest in the course/placement/job by asking questions; questions should be asked in appropriate tone of voice and attitude
3	Plan to arrive at the interview on time.	3.1	Confirm the time and place where the interview will be held	<ul style="list-style-type: none"> □ <i>Plan to arrive on time:</i> finding out journey times, using sources of travel information, considering different modes of travel, choosing best route, allowing for possible delays, using interview information or documentation to confirm interview details
		3.2	Plan a route and means of transport which will allow them to arrive on time.	

Information for tutors

Delivery

Delivery methods could include learner-centred tasks such as group work, research tasks and learner-led presentations.

During the delivery of this unit, learners should be given as much practical experience as possible in preparing for an interview.

To develop an understanding of how to answer questions at an interview for learning outcome 1, learners need to be aware of the purpose of the interview. This could be explored using practical activities, for example learners could work in groups to consider different interview situations and discuss possible questions that might be asked and appropriate answers. Learners could create guidelines which work as a factsheet for other learners to follow.

Role-play could be used to help learners to understand how to respond to questions they do not know the answers to.

For learning outcome 2, learners could work in small groups to discuss questions to ask the interviewer in different interview situations. Learners could then report back to the rest of the group.

Learners working in small groups could be given an interview venue, date and time and complete research using the internet or local transport information leaflets to select a route and means of transport to allow them to arrive at the interview on time. Learners can present their travel plans to the group and discuss the reasons for their choices.

The interview being prepared for may be for a job, placement or place on a training course. It could be a real situation but a simulated interview is equally acceptable. Whether real or simulated, every effort should be made to provide an interview opportunity that relates directly to the learner's current or intended work or training interests.

Assessment

The centre will devise and mark the assessment for this unit.

Learners must meet all assessment criteria to pass the unit.

The assessment criteria for this unit may be combined into one assessment task. The learner may present all the required information as a leaflet. Alternative methods of evidencing may be used.

The assessment for this unit could take the form of preparing for and participating in a 'mock' interview. The learner could either choose a job that they have seen themselves or examples of job vacancies could be provided by the tutor. The learner could prepare answers to possible interview questions and go on to prepare questions they would like to ask the interviewer. The learner could then be given a time and place for the mock interview. They should arrive in good time for the interview, appropriately dressed.

To achieve 1.1, the learner will need to state the purpose of the interview for example applying for a job as a sales assistant, and give answers to four questions which are relevant to the purpose of the interview. The questions may be those

agreed in class discussions but the learner's response must reflect their own understanding of the stated purpose of the interview.

For 2.1, the learner will need to give four questions to ask the interviewer which are relevant to the stated job, placement or course. The learner might identify a range of possible questions through group discussion or other guidance, but should select the final set of questions independently.

For 3.1, the learner needs to give (independently) a precise interview time and venue from information given to them.

For 3.2, the learner needs to give, from a given range of resources, the correct information about a route and means of transport which would allow them to arrive at the interview on time.

Links to other BTEC units, other BTEC qualifications and other relevant units and qualifications

This unit forms part of the *WorkSkills from Edexcel* suite. This unit has particular links with:

Entry Level	Level 1	Level 2
Unit 5: Searching for a Job	Unit 5: Searching for a Job	Unit 4: Searching for a Job
Unit 6: Applying for a Job	Unit 6: Applying for a Job	Unit 5: Applying for a Job
Unit 7: Preparing for an Interview	Unit 8: Interview Skills	Unit 6: Preparing for an Interview
Unit 8: Interview Skills	Unit 11: Career Progression	Unit 7: Interview Skills
Unit 11: Career Progression		Unit 10: Career Progression

Suggested resources

Websites

http://www.direct.gov.uk/en/YoungPeople/DG_10016186

www.direct.gov.uk/en/Employment/Jobseekers/LookingForWork

www.direct.gov.uk/en/TravelAndTransport/PlanningYourJourney

www.direct.gov.uk/en/YoungPeople/Workandcareers/Gettingyourfirstjob

www.open.ac.uk/careers/preparing-for-an-interview.php

Unit 15: Interview Skills

Unit reference number: R/501/5847

QCF level: 1

Credit value: 1

Guided learning hours: 10

Unit aim

The purpose of this unit is for learners to acquire the basic communication skills needed for an interview, be it for a job, work placement or training course. Learners are presented with an interview as a multi-faceted experience which includes the use of both verbal and non-verbal communication. Learners will learn about the importance of answering interview questions clearly and appropriately. The emphasis is on being able to apply all the acquired interview skills in a way that is appropriate for the interview context. Learners will also be guided through a post-interview reflection so that they understand the value of learning from the interview experience.

Essential resources

Learners need the opportunity to participate in a real-life or simulated interview.

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	Present themselves appropriately at an interview	1.1	Arrive in good time for the interview	<ul style="list-style-type: none"> □ Present themselves appropriately: timekeeping; the role of non-verbal communication and body language in creating the correct impression, awareness of tone of voice and facial expressions; showing the interviewer you are paying attention to the questions
		1.2	Use appropriate means of non-verbal communication such as body language, facial expressions and tone of voice	
2	Answer the interviewer's questions appropriately	2.1	Respond clearly to the questions asked by the interviewer, using language appropriate to an interview situation	<ul style="list-style-type: none"> □ Answer the interviewer's questions appropriately: language appropriate to an interview context when answering the interviewer's questions; clarity and politeness in communication; listening carefully to the questions before answering
3	Understand their performance in an interview	3.1	Describe what went well and what did not	<ul style="list-style-type: none"> □ Answer the interviewer's questions appropriately: language appropriate to an interview context when answering the interviewer's questions; clarity and politeness in communication; listening carefully to the questions before answering

Information for tutors

Delivery

By combining various aspects of the unit, tutors/line managers should be able to cover all the learning outcomes through practical activities.

A question and answer session could determine different situations that require interviews. Learners could work in groups to discuss the general purposes of interviews.

Guest speakers could be invited to speak to learners about the importance of timekeeping and personal presentation at interviews. Learners would find it helpful to prepare questions to ask the speaker about their expectations of someone in an interview situation. Learners could also create guidelines which work as a factsheet for other learners to follow.

To develop knowledge and understanding of the effect of non-verbal communication during an interview, learners could watch videos of interviews and complete a related worksheet. In groups, learners could discuss cultural differences in non-verbal communication which would be relevant in an interview situation and report back to the rest of the group. Examples could include cultural differences about whether or not to make eye contact with a senior or older person or whether or not to shake someone's hand at the beginning or end of an interview.

Learners could practise their interview skills using role-play exercises of different interview situations. Learners could be involved in peer assessment of verbal and non-verbal communication skills, which would be helpful to learners when understanding their performance in an interview for learning outcome 3.

The interview may be for a job, placement or place on a training course. It could be a real situation but a simulated interview is equally acceptable. The interview should last for around 10 minutes. The interviewer should use straightforward language and make sure that questions are clearly phrased and unambiguous. The interviewer may be familiar to the learner but it would be helpful if it was not the learner's usual tutor for this area of learning or their immediate line supervisor in the workplace.

Assessment

The centre will devise and mark the assessment for this unit.

Learners must meet all assessment criteria to pass the unit.

The learner should be dressed appropriately for the interview. The definition of 'appropriately' will differ from one workplace or course to another, depending on the nature of the job, placement or course applied for. The learner's appearance should be consistent with that normally expected of interviewees in the particular setting. Regardless of setting, learners should have paid attention to their personal hygiene and be wearing clean clothes.

Appropriate body language may include polite tone of voice, sitting up straight, sitting still and clearly paying attention to the interviewer, for example by nodding the head, taking papers passed to them. Tutors or line managers should assess the appropriateness of the learner's non-verbal communication in the light of any relevant cultural factors.

During the interview, the learner should concentrate on the interviewer, avoiding distractions and listening carefully to the questions they are asked. They should give their answers clearly, making sure that their responses are relevant.

Evidence to support observation of the learner's performance in the interview could be a written statement by the tutor, line manager or interviewer or could be a video with supporting commentary from the tutor or line manager.

For 3.1, the learner should be able to identify parts of their performance that went well and not so well. This might relate to particular questions or to aspects such as body language or listening carefully. They might reflect on the interview by watching it back on video, listening to it on a recording, or discussing it with the interviewer or other observers. It is appropriate for any of these parties to offer constructive criticism and for the learner to include this feedback in their review of their performance, should they wish to do so. However, their self-evaluation should represent their own views on their performance and should be recorded independently. Evidence to support this can be either written, for example through written statements from the learner on the review of their performance and/or supporting statements from the tutor, line manager or other person involved in the discussion and review, or through a video or taped discussion.

Links to other BTEC units, other BTEC qualifications and other relevant units and qualifications

This unit forms part of the *WorkSkills from Edexcel* suite. This unit has particular links with:

Entry Level	Level 1	Level 2
Unit 5: Searching for a Job	Unit 5: Searching for a Job	Unit 4: Searching for a Job
Unit 6: Applying for a Job	Unit 6: Applying for a Job	Unit 5: Applying for a Job
Unit 7: Preparing for an Interview	Unit 7: Preparing for an Interview	Unit 6: Preparing for an Interview
Unit 8: Interview Skills	Unit 11: Career Progression	Unit 7: Interview Skills
Unit 11: Career Progression		Unit 10: Career Progression

Suggested resources

Websites

www.direct.gov.uk/en/Employment/Jobseekers/LookingForWork

www.open.ac.uk/careers/interviews.php

www.worksmart.org.uk/career/interviews

Unit 16: Positive Attitudes and Behaviours at Work

Unit reference number: A/501/5826

QCF level: 1

Credit value: 1

Guided learning hours: 10

Unit aim

In any workplace, it is important to have a positive attitude and behave in an appropriate manner. Employers and employees expect certain types of conduct to be demonstrated within the workplace, making constructive attitudes and behaviours essential employability skills.

This unit focuses on the importance of positive attitudes and behaviours and their impact on the workplace. Learners will need to show that they understand and can demonstrate appropriate behaviours in the workplace. They will also need to carry out some analysis of their strengths and weaknesses by conducting a review of their performance.

Essential resources

Copies of organisational procedures for different types of organisation as appropriate – for example centres procedures for staff and/or learners relating to conduct and behaviour (or if in the workplace, copies of workplace procedures).

Relevant training or developmental courses relating to good conduct (for example assertiveness, communication skills).

Copies of any appraisal systems which recognise good conduct/performance.

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 how positive attitudes and behaviours at work benefit themselves and their organisation	1.1	Explain why it is important to follow an organisation's rules and procedures	<ul style="list-style-type: none"> □ Importance of following organisation's rules and procedures: eg avoids breaking the law, complying with health and safety requirements, avoids confusion in carrying out tasks
		1.2	Describe the benefits of positive attitudes and behaviours for themselves and their organisation	<ul style="list-style-type: none"> □ Benefits of positive attitudes and behaviours to the employee and their organisation: eg enhances how others view you, pay or reward could be linked to personal appraisal and performance, helps keep yourself and colleagues healthy and safe, increased productivity for organisation, pleasant working atmosphere
2	Demonstrate a range of positive attitudes and behaviours in the workplace	2.1	Interact appropriately with colleagues and customers	<ul style="list-style-type: none"> □ Interacting appropriately with colleagues: communicating with a range of familiar people eg members of team, line manager, supervisor, people from other departments; interacting appropriately with other colleagues eg carrying out task accurately and cheerfully, listening politely to opinion given by a team member □ Interacting appropriately with customers: communicating with a range of customers in non-complex and familiar situations eg dealing with routine enquiries from customers, taking messages
			2.2	Follow organisational procedures governing attitudes and behaviours at work
3	Evaluate their own conduct	3.1	Describe what went well and what did not	<ul style="list-style-type: none"> □ Evaluation of own conduct: identifying aspects of own performance that went well eg passed on all phone messages clearly to manager; identifying aspects of own performance that did not go so well eg forgot to fill in timesheet for the day

Information for tutors

Delivery

This unit may be delivered in the workplace, as part of a work placement or volunteering commitment, or in a simulated situation in a school or college. The positive behaviours described in the unit are those expected of learners within an educational context as well as of employees in a workplace. It is therefore likely that learners will already be aware of the need for appropriate conduct in a general context.

Learning outcome 1 could be delivered through group discussion or discussion between the learner and their line manager/tutor or another appropriate person familiar to the learner. Tutors or line managers might wish to support the group or individual learner by facilitating a discussion to help learners think about the importance of following an organisation's rules and procedures. Tutors or line managers could begin by explaining that every organisation has rules and procedures governing the behaviours of its employees. The group/individual could be given copies of organisational procedures and asked to discuss an aspect of them, (for example expectations on dress, behaviour towards colleagues) and explain why these are important (for example why it is important that employees treat each other with respect, why it is important not to be aggressive or abusive to other employees). They could also consider the consequences of not following procedures such as health and safety (for example if they or someone else did not work with due care and attention, this could compromise their own safety and that of others), or the impact on themselves of disciplinary or other measures.

Tutors or line managers could then explore the benefits of having a positive attitude by asking learners to think about how exhibiting positive attitudes and behaviours can benefit themselves and their organisation. Learners could create posters or leaflets to record their ideas.

Learning outcome 2 could be demonstrated in a variety of ways. In a work situation, learners could carry out their normal daily activities whilst being observed by their line manager, supervisor or another responsible person. In a simulated situation, learners could be provided with (or agree with their tutor) a scenario for the workplace which enables them to demonstrate the required positive attitudes and behaviours.

For learning outcome 2, learners in the workplace could be observed interacting with members of their team, their line manager, supervisor or familiar people from other departments (eg their contact in finance or HR). These may not be regular contacts but will be known to the learner. If this is a simulated exercise, learners may be observed interacting with a range of people – some familiar and some less familiar to them.

Tutors/line managers could use the organisational procedures from the learner's own workplace, college or other place of training, provided the procedures address matters of attitude and behaviour.

Learning outcome 3 could be delivered through a one-to-one discussion between the tutor or line manager and the learner.

Assessment

The centre will devise and mark the assessment for this unit.

Learners must meet all assessment criteria to pass the unit.

To achieve 1.1, the learner must explain at least two reasons why it is important to follow organisational procedures. For 1.2, the learner must describe the benefits of positive attitudes and behaviours for an individual (at least one benefit for the individual) and for an organisation (at least one benefit for the organisation). Evidence to support this could be records of group or individual discussion. These could either be written by the tutor or line manager, written by the learner with sign-off from the tutor/line manager, or via video or audio recording.

To achieve 2.1 and 2.2, the learner needs to demonstrate that they can interact appropriately with colleagues and customers and follow organisational procedures. Tutors and others may support them in this. Interactions should form part of the learner's day-to-day activities, which need not be complex or demanding. The positive attitudes and behaviours demonstrated by the learner could include examples such as passing on a telephone message to a colleague, turning up to a team meeting on time, answering a routine query from a customer, recording information about a customer complaint, using organisational systems to record annual or sick leave, knowing about organisational rules on the use of IT (for example use of the internet and email), understanding general organisational procedures for conduct and behaviour (for example dress code) or knowing who to contact if they are unable to get to work or need advice on a work-related matter. Whilst the learner may seek clarification from others regarding organisational procedures, they must know how to access the relevant sources of information and use them independently.

The demonstration needs to be observed either by the tutor or another person designated to assess the learner (for example a line manager or supervisor). The observation should form the basis of a discussion with the learner after the demonstration, about their performance. This observation could be a written statement by the tutor or line manager (which would support good practice for appraisal and review in the workplace) or a video with supporting commentary from the tutor or line manager.

To achieve 3.1, the learner must carry out an evaluation of their performance in which they describe what went well and what that did not go well in demonstrating the positive conduct referred to in 2.1 and 2.2. They might discuss this with their tutor or other observers; it is appropriate for any of these people to offer constructive criticism and for the learner to include this feedback in their review of performance, if they wish to do so. Their self-evaluation must, however, represent their own views on their performance and should be recorded independently.

Evidence to support this can either be written, for example through written statements from the learner on the review of their performance and/or supporting statements from the tutor, line manager or other person involved in the discussion and review, or through video or taped discussion.

Written statements by the learner do not have to be lengthy and can be discussed and agreed by the tutor/line manager and the learner in advance.

Links to other BTEC units, other BTEC qualifications and other relevant units and qualifications

This unit forms part of the *WorkSkills from Edexcel* suite. This unit has particular links with:

Entry Level	Level 1	Level 2
Unit 12: Conduct at Work	Unit 17: Working in a Team	Unit 20: Investigating Rights and Responsibilities at Work
Unit 9: Self-management Skills	Unit 19: Building Working Relationships with Colleagues	Unit 15: Effectiveness at Work
	Unit 9: Self-management Skills	Unit 16: Working in a Team
		Unit 19: Building Working Relationships with Colleagues
		Unit 8: Self-management Skills

Suggested resources

Websites

www.lifecoachexpert.co.uk/

www.worketiquette.co.uk/

www.worksmart.org.uk/career

Unit 17: Working in a Team

Unit reference number: L/501/5832

QCF level: 1

Credit value: 3

Guided learning hours: 30

Unit aim

Since very few people work in complete isolation in the workplace, most employers seek employees who are able to work effectively with others in a team or group setting. An effective team depends on the cooperation and skills of all team members. This unit helps the learner to understand how they can contribute to the success of a team, based on an understanding of their own strengths, skills and experiences, as well as the nature of the task at hand. Additionally, learners will develop an understanding of the key behaviours and attitudes required in order to communicate and cooperate with others in a team. The learner will also learn about the roles and responsibilities of all team members by completing a team task. Learners will consider their own effectiveness as a team member and identify areas for improvement.

Essential resources

Learners will need the opportunity to participate in a team-working task.

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 that effective team-work requires team members to behave in certain ways	1.1 Describe positive behaviours necessary for effective teamwork	<ul style="list-style-type: none"> Behaviours for effective teamwork: encouraging, considerate, ability to listen, respectful, tolerant, patient, flexible, loyal, ability to accept constructive criticism, able to motivate others
		2	Understand how own strengths, skills and experiences may contribute to a team task
3	Understand the roles and responsibilities of team members (including their own) in relation to a given task	3.1 Describe what the task is about and what the team is working to achieve	<ul style="list-style-type: none"> What team is working to achieve: aim or aims of the team's task, assignment or project; goals, deadlines, timelines; particular quality or standard of work required
		3.2 Describe own role and responsibilities and those of others in the team	<ul style="list-style-type: none"> Responsibilities within the team: own individual roles and responsibilities agreed with whole team; individual roles and responsibilities of other team members
		3.3 Explain how their own role contributes to the work of the team as a whole	<ul style="list-style-type: none"> Contribution of own role to work of whole team: how own role affects roles of others in the team; how own role affects overall team success

Learning outcomes	Assessment criteria	Unit amplification
4 Be able to work positively as a member of a team	<p>4.1 Give examples of when they listened to the ideas and suggestions of others</p> <p>4.2 Give ideas and suggestions as to how the team might complete their task</p> <p>4.3 Outline examples of when they offered to help or support other team members</p> <p>4.4 Outline examples of when they accepted the help or advice of others</p> <p>4.5 Complete the aspects of the task they were allocated, in line with the brief</p>	<ul style="list-style-type: none"> □ Listen to the ideas and suggestions of others: paying attention to and showing respect for the advice, ideas, suggestions or opinions put forward by others eg by not interrupting, asking questions to clarify what was said □ Give ideas and suggestions as to how the team might complete their task: eg by participating in group discussions, problem solving or 'thought shower' sessions, finding out information and reporting back to the group □ Offer help to other team members: eg offer to help other team members complete their task, volunteer to take on the task of a team member who is absent □ Accept help or advice from other team members: eg try out ideas or suggestions put forward by others, listen respectfully to advice from another team member, accept help from other team members in order to get individual task finished on time □ Complete own task in line with the given brief: complete task to required standard and within stipulated timeframe
5 Be able to consider their performance as a member of a team.	<p>5.1 Describe which positive teamworking behaviours they demonstrated in undertaking the task</p> <p>5.2 Identify some teamworking skills that they could improve.</p>	<ul style="list-style-type: none"> □ Positive teamworking behaviours demonstrated: listened to opinions of others, responded politely to questions, satisfactorily completed the individual task assigned to them, helped others carry out their tasks or responsibilities, offered suggestions as to how the team's goals could be achieved, accepted advice from others, learner's own contribution contributed to success of whole task □ Identify teamworking skills that could be improved: eg be more patient with other team members, don't interrupt when others are making suggestions, pay more attention to timings allocated for completion of own individual task

Information for tutors

Delivery

The emphasis in this unit is on developing the learner's knowledge and understanding of teamwork through a practical teamworking task.

In order for learners to understand the positive behaviours necessary for effective teamwork in learning outcome 1, it would be useful for learners to compare two different teamworking scenarios. This could be done in small groups. A question and answer session could determine the positive behaviours. Key words could be collated on a board or flipchart. Teams could work to design a poster or presentation which identifies positive behaviour. The posters or presentations could be displayed in the class or working area for learners to refer to during the rest of the unit. Alternatively, line managers could discuss with individual learners their impressions of different teamworking scenarios within the workplace. The learner could obtain input from other colleagues regarding their ideas on positive behaviours required for teamwork.

Learning outcomes 2, 3, 4 and 5 require the identification of team and individual tasks which would enable the participation of all group members. Learners could be involved in selecting the group task. Teams could be made up of around four to seven people. In teams, learners could discuss possibilities for tasks and then report back to the rest of the group. Learners could develop a whole group discussion to decide which tasks are manageable, achievable and match the skills and interests of the team members in 'what if?' scenarios.

For learning outcome 2, learners could make a list of their own strengths, skills and experiences and match them to individual tasks in the chosen group task.

For learning outcome 3, learners could work with team members for the group task to develop a mind map or flow chart-type diagram, using prompts and question and answer sessions until a picture of the whole task and the individual roles and responsibilities of each member is complete. Learners could present their ideas about how their own role contributes to the work of the team as a whole to the rest of the group.

Learners will need to implement the agreed team task for learning outcome 4. Learners could work in groups to devise a checklist to log their involvement in the task.

Learners should be encouraged to analyse their own performance in the team task for learning outcome 5, using evidence from their checklist. Individual learners should concentrate on their behaviour and skills as a member of the team rather than how well the outcome was achieved. Ways for learners to develop teamworking skills could be explored through tutorials, small-group discussions or discussions with a line manager or supervisor.

Assessment

For 1.1, the learner must explain why three different positive behaviours are needed for teamwork to be effective. This information could be evidenced in a number of different ways for example a leaflet, presentation or poster.

For 2.1 and 2.2, the learner will need to refer to the identified group task when identifying their own strengths, skills and experiences and how these may help

them complete aspects of the task. A chart could be suitable evidence for these criteria. The learner needs to be able to make the link between their own strengths, skills and experiences and the group task. Alternative methods of evidencing learning may be used.

The evidence required for 3.1, 3.2 and 3.3 could be combined into one task. The information could be evidenced in a number of ways such as PowerPoint slides, a poster or through one-to-one discussion with the tutor or line manager. The learner will need to refer to the chosen task and give clear details about the task and its intended outcome, and the role and responsibilities of all members of the team for 3.1 and 3.2.

For 3.3, the learner will need to give at least two reasons why their own role is necessary for the successful completion of the group task.

The evidence required for 4.1, 4.2, 4.3, 4.4 and 4.5 may be provided in a logbook completed by the learner during the task. The logbook may take a variety of formats, depending on the needs of individual learners. The logbook will need to be verified by the tutor/line manager. Alternative methods of evidencing may be used for example a witness statement or observation.

For 5.1, the learner will need to provide details about which positive teamworking behaviours (identified in 1.1) they demonstrated during the completion of the task. Two ways the learner could improve their teamworking skills would provide the evidence for 5.2. Both these criteria could be assessed through one-to-one discussion with the tutor/line manager. Responses should be recorded for verification purposes.

Links to other BTEC units, other BTEC qualifications and other relevant units and qualifications

This unit forms part of the *WorkSkills from Edexcel* suite. This unit has particular links with:

Entry Level	Level 1	Level 2
Unit 12: Conduct at Work	Unit 16: Positive Attitudes and Behaviours at Work	Unit 16: Working in a Team
Unit 13: Working in a Team		Unit 15: Effectiveness at Work
		Unit 18: Building Working Relationships with Colleagues

Suggested resources

Websites

www.lifecoachexpert.co.uk/

www.projectsmart.co.uk/team-building.html

www.worksmart.org.uk/career

Unit 18:

Investigating Rights and Responsibilities at Work

Unit reference number: L/501/6382

QCF level: 1

Credit value: 1

Guided learning hours: 10

Unit aim

Everyone has the right to be able to work in a healthy and safe environment, the right to be treated fairly and the right to be respected. The area of rights and responsibilities at work and how it affects the people you work with, is an extensive subject. This unit provides an introduction to the concept by discussing basic rights at work and how these rights can be enforced through guidelines, company policies and legislation.

This unit also challenges individual's perceptions of others and how employers and employees should respect the rights of others. The laws that have been introduced to support employees will be considered. However it is not anticipated that these laws will be considered in depth. The learner will know about the law and how to find more information on the content if ever they needed to refer to it.

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 what 'rights' and 'responsibilities' are	1.1	Explain what 'rights' are	<ul style="list-style-type: none"> □ <i>Rights</i>: basic human rights eg right to life, freedom, education, respect and dignity, to own property, equality before the law; rights at work eg healthy and safe environment, working conditions, respect, privacy of personal information, fair pay/wages, paid holiday time, right to join and form trade unions
		1.2	Explain what 'responsibilities' are	<ul style="list-style-type: none"> □ <i>Responsibilities</i>: responsibility to protect, improve and not infringe other's rights; work responsibilities eg contractual obligations, health and safety requirements
2	Understand how to respect the rights of individuals	2.1	Explain the factors that may affect the rights of individuals	<ul style="list-style-type: none"> □ <i>Factors affecting rights of individuals</i>: positive images; perceptions eg stereotyping, labelling; unfair discrimination and injustice; cultural background; ignorance or lack of human rights
		2.2	Explain how to respect the rights of individuals	<ul style="list-style-type: none"> □ <i>How to respect others</i>: appropriate behaviour eg use of appropriate language, politeness in communicating with others, not putting others in danger or at risk through inappropriate behaviour in the workplace, showing tolerance and respect for differences and diversity, avoiding unfair discrimination against others, challenging own perceptions to ensure fairness of thought and action
3	Know laws that can protect the rights of employees	3.1	Identify laws that can protect employee rights	<ul style="list-style-type: none"> □ <i>Laws</i>: laws relating to employee rights eg health and safety, working conditions, salary, equality of opportunity, discrimination, privacy of personal information (Data Protection Act)

Learning outcomes	Assessment criteria	Unit amplification
4 Know that employers have certain responsibilities.	4.1 Identify employer responsibilities in regard to: - fulfilling a contract - health and safety - equal opportunities and prevention of discrimination.	<ul style="list-style-type: none"> □ <i>Employee's responsibilities:</i> health and safety; working conditions; contractual; equality of opportunity, confidentiality of company or organisational information

Information for tutors

Delivery

Tutors will need to be creative in their approach to this unit which is largely based on knowledge and understanding rather than skills. Active learning, however, can still be achieved, for example through learners going into the workplace to interview employers and employees or through role-playing scenarios. Debate and discussion should also be encouraged, particularly when defining the terms and considering rights and responsibilities beyond those enshrined in law.

Learners should be introduced briefly to the concept of rights and responsibilities in general before they focus on those that relate to the workplace. Discussion might include human rights, rights and responsibilities set out in legislation and those that are less formal such as those relating to particular groups or settings (for example within a school, college, society or club).

Learners would benefit from the opportunity to discuss terms associated with respecting the rights of others for example stereotyping, labelling, prejudice, positive images, discrimination, ageism, racism, sexism, diversity, cultural background. Simple tasks may be used to help the learner understand these concepts, for example they could make a list of the things they believe in and value. They could then consider how this might affect their work. Learners could also be encouraged to discuss how television or radio or magazine advertisements influence the way people think of others for example through gender stereotyping or generalised perceptions of various cultures, nationalities or age groups. Discussions could then follow on how this could affect work for example women are often seen taking on a domestic role at home and a much smaller percentage of women receive high-paid jobs.

Scenarios could be used as a basis for research into what laws have been put in place to protect the rights of individuals at work for example a colleague or partner has become pregnant. What are your colleague's rights and what rights does the partner have? What laws are in place to support this? This learning outcome could also be linked with learning outcome 4. Learners could find out where they can get help and advice both within the workplace and outside.

Learners will probably find it useful to relate employer responsibilities to the particular aspects of rights and responsibilities they have covered when looking at them from an employee's perspective. They should be encouraged to think about how the employer, through meeting their responsibilities, allows employees to exercise their rights. (For example an employer's responsibility to maintain a healthy and safe workplace is put in place to ensure that employees' right to work in a healthy and safe environment is observed.)

Assessment

The centre will devise and mark the assessment for this unit.

Learners must meet all assessment criteria to pass the unit.

In order to achieve 1.1 and 1.2, the learner must explain what rights and responsibilities are. Practical examples may help to support the learner's response to these criteria.

In order to achieve 2.1, the learner should be able to identify three different factors that may affect the rights of an individual. They should then be able to explain how each factor may affect the rights of the individual.

The evidence provided for 2.2 could be in the form of an information leaflet or booklet which explains how we should respect our colleagues at work. Alternatively, a written explanation may be given or an oral presentation could be an effective method of assessment.

To achieve 3.1, the learner must identify three different laws relating to the rights of individuals at work. The learner should name the law and provide a brief, basic outline of the purpose of the law.

4.1 focuses on the employer's responsibilities. The learner must be able to describe the employer's responsibilities at work in regard to fulfilling a contract, health and safety and equal opportunities/prevention of discrimination. Practical examples should be given to support each of these areas. (At least one example is required for each area.)

Links to other BTEC units, other BTEC qualifications and other relevant units and qualifications

This unit forms part of the *WorkSkills from Edexcel* suite. This unit has particular links with:

Entry Level	Level 1	Level 2
Unit 2: Working as a Volunteer	Unit 2: Working as a Volunteer	Unit 2: Working as a Volunteer
Unit 9: Self-management Skills	Unit 9: Self-management Skills	Unit 8: Self-management Skills
Unit 12: Conduct at Work	Unit 16: Positive Attitudes and Behaviours at Work	Unit 15: Effectiveness at Work
Unit 14: Investigating Rights and Responsibilities at Work	Unit 22: Managing Your Health at Work	Unit 20: Investigating Rights and Responsibilities at Work
Unit 15: Managing Your Health at Work	Unit 28: Preparing for Work Placement	Unit 21: Managing Your Health at Work
Unit 20: Preparing for Work Placement	Unit 30: Safe Learning in the Workplace	Unit 26: Preparing for Work Placement
Unit 22: Safe Learning in the Workplace		

Suggested resources

Websites

www.acas.org.uk

www.citizensadvice.org.uk

www.direct.gov.uk/en/youngpeople

www.direct.gov.uk/en/RightsAndResponsibilities/Yourrights

www.tuc.org.uk

www.worksmart.org.uk

Unit 19: Planning an Enterprise Activity

Unit reference number: F/501/5942

QCF level: 1

Credit value: 1

Guided learning hours: 10

Unit aim

Enterprise activities offer opportunities to learn and develop the entrepreneurial characteristics of tenacity, independence, innovation, imagination, risk taking, creativity, intuition and leadership. The aim of this unit is for learners to develop an understanding of how to set up an enterprise activity to sell a product or service, including the costs and responsibilities involved. Learners will also consider the skills required for the enterprise activity and how to promote the activity.

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 how to select a suitable enterprise activity	1.1	Describe the strengths and weaknesses of generated ideas for an enterprise activity	<ul style="list-style-type: none"> □ Strengths and weaknesses of enterprise activity ideas: availability and cost of resources eg human and financial resources, materials, facilities, equipment, timescales, specific skills and knowledge required, potential demand for product or service, potential competition
2	Know appropriate roles and skills required for the enterprise activity	2.1	List roles and the practical and personal skills required for the enterprise activity	<ul style="list-style-type: none"> □ Roles required: eg planner, salesperson, manufacturer, administrator, financial controller □ Practical and personal skills required: planning skills, budgeting and financial skills, manufacturing skills, communication, confidence, knowledge of product or service, customer service skills, promotional and selling skills
3	Understand the costs involved in producing and selling a product or service	3.1	Use basic calculations to show the cost of items and processes related to producing and selling the product or service	<ul style="list-style-type: none"> □ Production costs: ingredients, components, equipment, facilities, skills, time □ Selling costs: advertising, printing of leaflets or flyers, facilities eg hire of stall at charity event or local market
		3.2	Use basic calculations to show the final pricing of the product or service	<ul style="list-style-type: none"> □ Pricing of the product or service: realistic pricing; covering costs and making a profit
4	Know appropriate promotional techniques.	4.1	Provide appropriate promotional materials and methods for promoting the product or service.	<ul style="list-style-type: none"> □ Promotional materials and methods: selection of relevant media for promotion eg poster, leaflet, flyer, launch event; using a logo or branding; using pricing strategies eg special introductory discount; conveying information about product or service in a way that is clear, accurate and attractive eg information about location, availability, contact information, features of product or service

Information for tutors

Delivery

This unit has been designed to make the key topics practically based wherever possible. Learners should be encouraged to gain an understanding of the relevant enterprise concepts in a highly applied way. Group working and group discussion would be appropriate, even where the learner's own assessment evidence needs to be recorded separately.

An enterprise activity does not have to be a large-scale activity. The activity can either be producing a product for example greeting cards or gift wrap, or providing a service for example selling ice cream or car washing. During the delivery of this unit, learners should be given as much practical experience as possible.

To introduce the unit, tutors could stimulate discussion as to what is needed for a successful enterprise activity and, through the discussion, ideas could be generated regarding different types of products and services. It is important to emphasise that the activity must be possible within the learner's current skills. These ideas could be explored individually or through group activity.

A question and answer session could determine the strengths and weaknesses of different enterprise ideas. The advantages and disadvantages of ideas could also be explored through the form of a *Dragons Den* type of presentation to a group, with peers commenting on the ideas.

Group discussion could be used to explore roles within an enterprise activity and the personal skills involved. Learners could also interview business people or consult entrepreneur websites for ideas on the kind of roles and skills needed for different types of enterprise activities.

In order for learners to understand the importance of promotional techniques and selling skills, it would be useful for them to watch clips of TV adverts and/or review advertising from a range of sources such as the internet, radio, newspapers and magazines. Point of sale advertising could be a useful resource which is also readily available. Specific information on selling skills could be gained from a range of services including books, internet and media articles. Personal skills in enterprise could be observed through TV documentaries on business start-ups and TV programmes such as *Dragons' Den*.

Learners could investigate costs of their chosen enterprise idea by active research via the internet or interaction with possible suppliers. Setting prices could be a result of research (such as questionnaires or a small-scale focus discussion), exploring what prices customers are prepared to pay for a product or service. Business people could also be interviewed for advice on how to set a realistic profit margin.

To complete this unit, learners could explore and research a variety of advertising media and promotional events as they decide on the appropriate promotion materials for their enterprise activity.

Assessment

The centre will devise and mark the assessment for this unit.

Learners must meet all assessment criteria to pass the unit.

This unit can be assessed through a series of structured tasks or activities including a mixture of theory-based and practical application.

For 1.1, the learner should be given the opportunity to discuss possible ideas for an enterprise activity before deciding on the strengths and weaknesses of the ideas. This could be part of a group discussion with a tutor or take place as an individual activity. The learner must identify more than one type of product or service before choosing one enterprise idea to pursue further in this unit. To achieve 1.1, the learner needs to identify at least one strength and one weakness in two different enterprise ideas.

To achieve 2.1, the learner needs to identify the different key roles for their enterprise activity. These could include examples such as the role of researcher, promoter, salesperson and keeping financial records. Additionally, the learner must be able to identify at least two different skills that would be required in the enterprise activity.

To achieve 3.1, the learner needs to identify a range of costs involved in producing their product or service. This could be presented as a brief poster or written presentation.

To achieve 3.2, the learner is required to use basic calculations to show how their product or service will be priced for sale. This could be included as part of the poster or presentation produced for 3.1. The level of calculations used and accuracy should be consistent with the Functional Skills for mathematics at level 1.

For 4.1, the learner must produce some promotional material for their product or service such as a flyer or poster which contains key information. This information should include an accurate description of the product or service, logo or branding, price, location and availability of the product or service and/or contact information.

Links to other BTEC units, other BTEC qualifications and other relevant units and qualifications

This unit forms part of the *WorkSkills from Edexcel* suite. This unit has particular links with:

Entry Level	Level 1	Level 2
Unit 23: Planning an Enterprise Activity	Unit 32: Running an Enterprise Activity	Unit 28: Planning an Enterprise Activity
Unit 24: Running an Enterprise Activity	Unit 33: Producing a Product	Unit 29: Running an Enterprise Activity
Unit 25: Producing a Product		Unit 30: Producing a Product

Suggested resources

Websites

www.businesslink.gov.uk

www.direct.gov.uk/en/youngpeople

www.enterprise-education.org.uk/

www.enterpriseinschools.org.uk/enterpriseinschools/index.php

www.speakeasydragons.com/

www.stridingout.co.uk

The unit can be delivered and assessed in a range of engineering settings and disciplines depending upon the learner's circumstances. However, it is important that the information used by the learner is relevant, realistic and current for a typical engineering context.

Essential resources

Learners will need access to sources of information (eg drawings, charts, tables, manuals) as defined by the content section. Wherever possible, centres should ensure that this data is relevant to the learner's current or expected work-based experience. Centres will need to have their own drawing/document storage facilities as an example of a typical care and control process for drawings and related documentation.

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
<p>1 Know how to interpret drawings and related documentation</p>	<p>1.1 extract information from engineering drawings and related documentation to enable a given task to be carried out</p>	<ul style="list-style-type: none"> <li data-bbox="456 161 767 1227">□ <i>Information:</i> materials or components eg location/orientation of parts, connections to be made, circuit characteristics (pressure, flow, current, voltage, speed); dimensional detail eg imperial and metric systems of measurement, physical dimensions, tolerances, fixed reference points, surface texture; manufacturing/production detail eg processes or treatments, assembly sequence or installation requirements; symbols and abbreviations eg surface finish, electronic components, weld symbols, linear and geometric tolerances, pressure and flow characteristics, torque values <li data-bbox="783 161 959 1227">□ <i>Engineering drawings:</i> working drawings eg component, general assembly/sub-assembly, fabrication, welding, repair/modification, fluid power, installation, wiring/circuit diagrams; graphical representations eg sketches, schematic diagrams, flow charts, physical layout diagrams, illustrations from manufacturers' manuals <li data-bbox="975 161 1134 1227">□ <i>Related documentation:</i> working instructions eg operation sheets/job cards, test schedules, manufacturers' manuals for assembly/test/installation, weld procedure specifications; quality control information eg national, international and organisational standards, reference tables/charts <li data-bbox="1150 161 1267 1227">□ <i>Tasks:</i> relevant to a manufacturing or engineering process operation eg product manufacture or modification, equipment installation or repair, system or service planning

Learning outcomes	Assessment criteria	Unit amplification
	1.2 select and use other information sources to support and check information provided	<ul style="list-style-type: none"> □ <i>Other information:</i> sources relevant to task eg electronic component pin configuration specifications, standard reference charts for limits and fits, tapping drill reference charts, bend allowances required for material thickness, metal specifications, manufacturers' data for the use of welding rods/bonding/finishing materials
2 Be able to use information from drawings and related documentation	2.1 identify and obtain relevant drawings and related documentation to carry out and check own work output	<ul style="list-style-type: none"> □ <i>Work output:</i> manufacturing or engineering process operation eg product manufacture/assembly/design, maintenance planning or procedure
	2.2 complete all necessary production documentation related to own work output	<ul style="list-style-type: none"> □ <i>Production documentation:</i> relevant to manufacturing or process operation eg job cards, test reports, quality control documentation
	2.3 describe the care and control procedures for the drawings and related documentation used when carrying out and checking own work output	<ul style="list-style-type: none"> □ <i>Drawing and document care and control:</i> location and security eg storage conditions, access points and return procedures, reporting discrepancies in data and documents; physical handling eg damage and effects from graffiti, cleanliness, folding methods; document control eg issue and amendment dates, part/pattern numbers, reporting of loss/damage

Grading criteria

In order to pass this unit, the evidence that the learner presents for assessment needs to demonstrate that they can meet all the learning outcomes for the unit. The criteria for a pass grade describe the level of achievement required to pass this unit.

Grading criteria		
To achieve a pass grade the evidence must show that the learner is able to:	To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:	To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:
P1 extract information from engineering drawings and related documentation to enable a given task to be carried out [IE4]	M1 identify gaps or deficiencies in the information obtained that need to be resolved to enable a given task to be carried out	D1 justify valid solutions to meet identified gaps or deficiencies with the information obtained.
P2 select and use other information sources to support and check information provided [IE4]	M2 identify improvements in the care and control procedures used for drawings and related documentation.	
P3 identify and obtain relevant drawings and related documentation to carry out and check own work output [IE4]		
P4 complete all necessary production documentation related to own work output		
P5 describe the care and control procedures for the drawings and related documentation used when carrying out and checking own work output.		

Merit or Distinction achieved on L2 units will not effect a BTEC L1 certificate unless the learner is going on to BTEC level 2

PLTS: This summary references where applicable, in the square brackets, the elements of the personal, learning and thinking skills, which are embedded in the assessment of this unit. By achieving the criteria, learners will have demonstrated effective application of the referenced elements of the skills.

Key	IE – independent enquirers CT – creative thinkers RL – reflective learners TW – team workers SM – self-managers EP – effective participators
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Information for tutors

Delivery

This unit should provide learners with a formal introduction to the selection and use of a range of engineering information sources such as drawings and related documentation. It is intended that the unit should be delivered in the order of the learning outcomes. That is, to first introduce the learner to the typical range of information required to carry out specific tasks, the way that engineering drawings are produced and used, and the information that they can convey and other related documentation. Second, to use this understanding of the range of information available and apply it to specific engineering tasks.

The setting of this unit will be determined in part by the focus of the qualification (for example operations and maintenance, mechanical/manufacture, electronic engineering) but also the particular needs of the local industries that centres work with. The relevance of the unit may be significantly enhanced through the centre's ability to link with these local industries to obtain working examples of engineering data and documentation.

As far as possible, centres should deliver the unit through practical application rather than theory and to achieve this the unit can be linked effectively with other BTEC Level 2 practical units (eg *Unit 5: Engineering Maintenance Procedures and Planning*, *Unit 9: Engineering Assembly Techniques*, *Unit 19: Electronic Circuit Construction and Testing*). The practical activities undertaken in these units could then provide a focus for the 'interpretation' required by learning outcome 1 and the context for the learner's 'own work output' related skills of learning outcome 2.

Note that the use of 'eg' 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 'eg' needs to be taught or assessed.

Outline learning plan

The outline learning plan has been included in this unit as guidance and can be used in conjunction with the programme of suggested assignments.

The outline learning plan gives an indication of the volume of learning it would take the average learner to achieve the learning outcomes. It is indicative and is one way of achieving the credit value.

Learning time should address all learning (including assessment) relevant to the learning outcomes, regardless of where, when and how the learning has taken place.

Topic and suggested assignments/activities

Whole-class teaching:

- introduction to the unit content, method of working and assessment
- introduction to the use of engineering drawings and related documentation
- explain the methods and range of use of engineering drawings and related documentation in manufacturing and process operations.

Group work:

- activities to examine examples of different types of engineering drawing and related documentation.

Whole-class teaching:

- introduction to interpretation of engineering drawings. Consider the style and presentation of drawings and graphical representations and the information that they convey.

Group work:

- activities to investigate given engineering drawings and present findings.

Whole-class teaching:

- introduction to engineering documentation. Consider the documentation used for working instructions and quality control information.

Group work:

- activities to investigate the documentation used to support and control given manufacturing and engineering process operations.

Preparation for and carry out assignment 1 – (P1, P2, M1 and D1).

Whole-class teaching:

- introduction to the use of drawings and related documentation to carry out and check own work
- whole-class teaching – use of production drawings and associated documentation.

Group work:

- investigation of manufacturing case study. Presentation of findings to the group.

Industry visit or guest speaker:

- to gain first-hand experience of production drawings and associated documentation in use.

Topic and suggested assignments/activities

Whole-class teaching:

- introduction drawing and document care and control. Explore methods used for the location and security of drawings and related documentation, physical handling of drawing and impact of damage/loss and document control techniques.

Group work:

- investigation of drawing and document control case studies. Presentation of findings to the group.

Industry visit or guest tutor:

- gain first-hand experience of drawing and document control.

Group work:

- carry out simple engineering tasks using drawings and related documentation and following document control procedures.

Preparation for and carry out assignment 2 (P3, P4, P5 and M2).

Feedback on assessment, unit evaluation and close.

Assessment

The centre will devise and mark the assessment for this unit.

Learners must meet all assessment criteria to pass the unit.

The assessment and grading criteria of this unit are all closely linked and as such, the summative assessment of the unit could possibly be achieved through one 'project style' activity. However, a staged approach could also be adopted using two assignments. The first assignment could consider the interpretation of engineering drawings and related documentation for learning outcome 1 (covering P1, P2, M1 and D1). The assignment would involve the extraction of information from the engineering drawings as well as the production of notes, annotation and sketches identifying specific features extracted from drawings and associated documentation. In addition, the learner would need to make relevant references to other information sources. It may be appropriate to use tutor observation and/or oral questioning to capture this evidence of the use of other information sources to ensure authenticity.

The second assignment, for LO2 and covering P3, P4, P5 and M2, could be based around a specified task that enables the learner to use information from drawings and related documentation to carry out the task and check their own work output. It will be necessary to have a sample of the learners own work output together with associated drawings, specifications and other documentation.

Whichever approach is used, single project or two assignments, it is important that the activities provide sufficient scope to cover the depth and breadth defined by the content.

To achieve a merit grade, the learner will need to identify gaps or deficiencies in the information obtained and which need to be resolved to enable a given task to be carried out. Learners will also need to identify improvements in the drawings and related documentation care and control procedures used. Centres will need to consider how best to prepare the learner for these two criteria. Both are strongly linked to the skills at pass level but they require the learner to be able to apply a

higher level of analysis and evaluation. Activities chosen for summative assessment will need to be carefully chosen to provide suitable opportunities for these two criteria to be achieved. For example, important dimensions not provided in drawings, components missed-off or additional to the drawing's parts list information, incorrect parts given, damaged/poor quality/graffiti-covered drawings or data books, or out-of-date information provided. The delivery methods used by the centre and, in particular, formative assessment can help in the development of these merit-level skills.

To achieve a distinction grade, the learner needs to demonstrate the ability to justify valid solutions to meet identified gaps or deficiencies with the information obtained. This will be reflected by the learner's ability to work with limited supervision and solve problems independently. The assessment activities will need to have these opportunities built into them to be effective in the same way as the merit criteria, as it would be wrong for centres to leave this to chance.

It is likely that the assessments will need to be carried out under controlled conditions and adequate time should be allowed for this within the learning programme. Tutors will also need to ensure that learners can access all of the relevant information required. Such information might consist of a library of drawings and other diagrams, specifications, manuals, job cards and other production documentation as appropriate to the context. Computer-based information sources and a technical library should be made available to learners as well as relevant standards available from BSI.

Note:

Merit or Distinction achieved on L2 units will not effect a BTEC L1 certificate unless the learner is going on to BTEC level 2

Assignments

The following table shows how the suggested assignments match and cover the assessment grading criteria.

Criteria covered	Assignment title	Scenario	Assessment method
P1, P2, M1, D1	Engineering Drawings and Documentation	An activity requiring learners to investigate, select, use, and extract information from a range of engineering drawings and related information.	<p>A report containing written responses about the information extracted from engineering drawings and related documentation to enable a manufacturing or engineering process operation to be carried out.</p> <p>Tutor observation record of the learner's use of sources relevant to the task.</p> <p>Report to include specific mention of any gaps or deficiencies in the information clearly indicating how these problems were resolved in order to carry out the task. Assessment to be carried out under controlled conditions.</p>

Criteria covered	Assignment title	Scenario	Assessment method
P3, P4, P5, M2	Using Engineering Information	An activity requiring learners to identify, obtain and make appropriate use of relevant drawings and documentation in order to check their own work output, completing all of the associated production documentation and observing appropriate care and control procedures.	A report containing written responses about the manufacturing or engineering process operation undertaken together with completed production documentation and a description of the documentation care and control procedures. Report identifying any improvements that could be made to the procedures. Assessment to be carried out under controlled conditions.

Links to other BTEC units, other BTEC qualifications and other relevant units and qualifications

This unit forms part of the *BTEC Engineering sector* suite. This unit has particular links with units from BTEC First in Engineering and BTEC Nationals in Engineering:

Level 2	Level 3
Unit 5: Engineering Maintenance Procedures	Unit 3: Engineering Project
Unit 9: Engineering Assembly Methods and Techniques	Unit 8: Engineering Design
Unit 10: Using Computer Aided Drawing Techniques in Engineering	Unit 16: Engineering Drawing for Technicians
Unit 19: Electronic Circuit Construction	Unit 17: Computer Aided Drafting in Engineering

The unit supports aspects of the SEMTA Level 2 National Occupational Standards, particularly:

Unit 2: Using and Interpreting Engineering Data and Documentation.

The nature of this unit means that it will support most areas of engineering study and work. In particular, it will underpin the work of most of the practical based units in the BTEC Firsts in Engineering.

Employer engagement and vocational contexts

This unit should be delivered and assessed in a vocational context. Case studies should be drawn from an appropriate range of different engineering contexts. For example, drawings and related documentation should not be restricted to a particular production sector and wherever possible learners should, as a minimum, be introduced to materials that support production in a range of different sectors including mechanical components and assemblies, electrical/electronic components and assemblies as well as hydraulic/pneumatic components and systems. In addition, both learning outcomes can be enhanced by industry visits and visiting speakers that can bring the subject to life by providing sector specific examples of the use and interpretation of engineering information.

Suggested resources

Books

Barclay, J and Griffiths, B – *Engineering Drawing for Manufacture* (Butterworth Heinemann, 2002) ISBN 9781857180336

Simmons, D, Maguire, D and Phelps, N – *Manual of Engineering Drawing* (Butterworth Heinemann, 2009) ISBN 9780750689854

Websites

www.asee.org

www.direct.gov.uk/en/youngpeople

www.standardsuk.com

www.theiet.org

Functional skills – Level 2

Skill	When learners are ...
ICT – Use ICT systems	
Select, interact with and use ICT systems independently for a complex task to meet a variety of needs	
Use ICT to effectively plan work and evaluate the effectiveness of the ICT system they have used	
Manage information storage to enable efficient retrieval	
Follow and understand the need for safety and security practices	
Troubleshoot	

Skill	When learners are ...
ICT – Find and select information	
Select and use a variety of sources of information independently for a complex task	Extracting information from engineering drawings, related documentation and other sources to enable a given task to be carried out.
Access, search for, select and use ICT-based information and evaluate its fitness for purpose	Accessing, selecting and using other information sources, that are considered fit for purpose, to support and check information provided.
ICT – Develop, present and communicate information	
Enter, develop and format information independently to suit its meaning and purpose including: <ul style="list-style-type: none"> <li data-bbox="225 869 475 898">□ text and tables <li data-bbox="225 920 368 949">□ images <li data-bbox="225 972 392 1001">□ numbers <li data-bbox="225 1023 384 1052">□ records. 	
Bring together information to suit content and purpose	
Present information in ways that are fit for purpose and audience	
Evaluate the selection and use of ICT tools and facilities used to present information	
Select and use ICT to communicate and exchange information safely, responsibly and effectively including storage of messages and contact lists	

Skill	When learners are ...
Mathematics	
Understand routine and non-routine problems in a wide range of familiar and unfamiliar contexts and situations	
Identify the situation or problem and the mathematical methods needed to tackle it	
Select and apply a range of skills to find solutions	
Use appropriate checking procedures and evaluate their effectiveness at each stage	
Interpret and communicate solutions to practical problems in familiar and unfamiliar routine contexts and situations	
Draw conclusions and provide mathematical justifications	
English	
Speaking and listening – make a range of contributions to discussions and make effective presentations in a wide range of contexts	
Reading – compare, select, read and understand texts and use them to gather information, ideas, arguments and opinions	<p>Reading engineering drawings, related documentation and other sources to gather sufficient information to enable a given task to be carried out.</p> <p>Reading relevant drawings and related documentation to gather information to carry out and check own work output.</p>
Writing – write documents, including extended writing pieces, communicating information, ideas and opinions, effectively and persuasively	Writing about the care and control procedures for the drawings and related documentation used to carry out and check own work output.

Unit 21: Engineering Marking Out

Unit reference number: J/600/0417

QCF level: 2

Credit value: 5

Guided learning hours: 30

Unit aim

This unit aims to give learners the skills needed to carry out marking out operations in a practical environment, in preparation for machining operations and component manufacture.

Unit introduction

The manufacture of a product always starts from raw materials that have to be formed and shaped into the components parts. The aim of this unit is to give learners the knowledge and use of skills needed for the measurement and marking out of components in preparation for machining operations. This first step in the manufacture or development of a product is critical to all the processes that follow.

The unit gives learners an opportunity to consider how to care for and use measuring and marking out equipment. It also introduces learners to work planning skills to enable them to carry out a range of marking out exercises including the selection of appropriate measuring, marking out and work-holding equipment. Learners will work with square, rectangular, circular and irregular shaped workpieces.

An important aspect of this unit is the consideration of safe working practices and good housekeeping in an engineering workplace environment delivered, where possible, in a practical context.

Essential resources

Access to a fully equipped workshop with access to the range of measurement and marking out equipment identified in the unit content is essential. A range of workpiece materials, components and drawings will also be required to enable the learner to gain the range of experience and coverage expected.

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 about marking out methods and equipment for different applications	1.1	select suitable measuring and marking out methods and equipment for three different applications	<p><i>Measuring and marking out methods:</i> equipment required; work-holding method and device(s); materials and consumables required; datum face(s) and/or reference points to be used</p> <p><i>Measuring and marking out equipment:</i> tools eg engineer's rule, scriber, centre punch, dividers, odd-leg callipers, engineer's square, scribing block, vernier protractor, vernier height gauge, dial test indicators, slip gauges; use and care of work-holding devices eg surface tables/plates, angle plates, v-blocks and clamps; calibration of measuring and marking out equipment; marking out mediums eg lacquer, whitewash</p> <p><i>Applications:</i> square/rectangular eg bar stock, sheet materials; circular/cylindrical eg bar stock, tubes, turned components, flat disks; irregular shapes eg castings, forgings, odd shaped components</p>
		1.2	describe the measuring and marking out equipment used for the three different applications	

Learning outcomes	Assessment criteria	Unit amplification
2	<p>2.1 prepare a work plan for marking out each of the three different applications</p> <p>2.2 mark out the three different applications to the prepared work plan</p> <p>2.3 demonstrate safe working practices and good housekeeping</p>	<p><i>Work plan:</i> reading engineering drawings and/or job instructions; planning the sequence of marking out operations; identifying materials and equipment required</p> <p><i>Marking out:</i> preparation of material eg identification of type of material (steel, cast iron, aluminium, plastics), checking for visual defects, cleaning component to remove protective coatings/rust/grease/dust, removing burrs and sharp edges; setting and positioning workpieces eg using squares, dial test indicators, slip gauges, packing pieces, jacks; marking out to a planned sequence of operations eg datum and centre lines, square/rectangular profiles, angles/angular profiles, circles, linear hole positions, radial hole positions, pattern development (cones, pyramids); centre punching of hole centres</p> <p><i>Safe working practices:</i> personal protection and hygiene procedures eg overalls, eye protection, barrier creams; appropriate behaviour in the working environment; maintaining a tidy and safe work area; appraisal of health and safety risks to self and others</p> <p><i>Housekeeping:</i> leaving the work area in a safe condition; cleaning of equipment; disposal of waste; storage of measuring and marking out equipment</p>

Grading criteria

In order to pass this unit, the evidence that the learner presents for assessment needs to demonstrate that they can meet all the learning outcomes for the unit. The criteria for a pass grade describe the level of achievement required to pass this unit.

Grading criteria		
To achieve a pass grade the evidence must show that the learner is able to:	To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:	To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:
P1 select suitable measuring and marking out methods and equipment for three different applications [IE1]	M1 recommend corrective action for unsafe or defective marking out equipment	D1 justify the choices of datum, work-holding equipment and measurement techniques used to mark out the three different applications.
P2 describe the measuring and marking out equipment used for the three different applications	M2 carry out checks to ensure that the marked out components meet the requirements of the drawing or job description.	
P3 prepare a work plan for marking out each of the three different applications		
P4 mark out the three different applications to the prepared work plan [SM2]		
P5 demonstrate safe working practices and good housekeeping. [EP1]		

Merit or Distinction achieved on L2 units will not effect a BTEC L1 certificate unless the learner is going on to BTEC level 2

PLTS: This summary references where applicable, in the square brackets, the elements of the personal, learning and thinking skills which are embedded in the assessment of this unit. By achieving the criteria, learners will have demonstrated effective application of the referenced elements of the skills.

Key	IE – independent enquirers
	CT – creative thinkers
	RL – reflective learners
	TW – team workers
	SM – self-managers
	EP – effective participators

Information for tutors

Delivery

This unit should be delivered using lectures, tutor demonstrations and practical engineering activities. A practical approach to delivery should be used and access to a fully equipped workshop with measurement and marking out equipment is essential. Learners should be given an opportunity to work with the full range of equipment as listed in the unit content and mark out raw material and components across the full range of applications including square/rectangular, circular/cylindrical and irregular shapes.

The delivery approach taken may be to introduce and develop the skills, methods, techniques and equipment to use when working with square bar and/or sheet metal then carry out an assessment activity. Once this has been achieved, move on to circular/cylindrical shaped workpieces, etc.

When delivering the unit, centres should endeavour to provide the widest possible range of experiences with marking out and measuring tools and, also with the range of workpieces and materials (eg steel, cast iron, aluminium, plastics). This experience should not be limited to current or planned employment sectors but used to extend the learner's appreciation of other areas of engineering.

Delivery of the practical marking out activity will require access to an engineering workshop environment, relevant tools and equipment. During the delivery of this phase of the unit, the learners could be provided with a range of simple marking out task to complete to enable them to practise their skills and to provide an opportunity for support and guidance to be given. Each task should be designed so that it requires the learners to plan and then complete the work activity. The opportunity to work with individuals during the delivery of this practical work can be used to good effect to underpin learning. In particular, it can be used to reinforce planning, marking out practices and skills, help them to deal with problems experienced or to support them in order to achieve the task.

Note however, that the use of 'eg' 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 'eg' needs to be taught or assessed.

Outline learning plan

The outline learning plan has been included in this unit as guidance and can be used in conjunction with the programme of suggested assignments.

The outline learning plan gives an indication of the volume of learning it would take the average learner to achieve the learning outcomes. It is indicative and is one way of achieving the credit value.

Learning time should address all learning (including assessment) relevant to the learning outcomes, regardless of where, when and how the learning has taken place.

Topic and suggested assignments/activities

Introduction to unit content assessment model, workshops, library and IT resources

Introduction

Whole-class teaching to:

- explain safe working practices, personal protection, hygiene procedures, appropriate behaviour in the working environment and importance of maintaining a tidy and safe work area
- explanation of the engineering drawing terms and abbreviations used in the marking out process.

Individual exercises to identify drawing types, terms and abbreviations.

Introduction to work planning

Whole-class teaching to:

- explain importance of work planning prior to marking out operations
- explain planning the sequence of marking out operations
- identify marking out equipment material requirements.

Individual activity:

- reading engineering drawings and plan equipment requirements and marking out operations

Tutor demonstration:

- marking out sequence simple component drawing on paper using drawing equipment.

Individual learner practise marking using equipment to mark out basic components on drawing paper.

Introduction to measuring and marking out methods and equipment:

Whole-class teaching to:

- explain marking out work holding methods, equipment requirements, materials and mediums used
- explain how to use, calibrate, and care for marking out equipment and tools.

Topic and suggested assignments/activities

Workshop activity tutor demonstration:

- demonstration of equipment, work holding equipment and marking out methods.

Workshop activity:

- learners practise using measuring and marking out tools and equipment.

Workshop practice continued

- lecturer demonstration and learners practise mark out simple component using equipment.

Introduction to marking out applications:

Whole-class teaching to:

- explain procedures, equipment requirements and marking out applications for square round and irregular shapes (theory).

Workshop activity, tutor demonstration

- procedures, equipment and marking out techniques used to mark out square round and irregular shapes.

Workshop activity – learners

- learners practise using techniques and equipment to mark out square round and irregular shapes (practical).

Marking out engineering workpieces to specification

Whole-class teaching:

- explain sequence of operations and material preparation prior assignment marking out exercises

Workshop activity – learners marking out: (practical)

- practical assessment activity 1 learners plan and mark out component prior to manufacture

Hand Out Assignment 1 TASK 1 Drawing No 1 COVER PLATE

P1 part, P2 part,P3 part, P4 part, P5 part, M1 part , M2 part.

Marking out engineering workpieces to specification

Workshop activity – learners marking out: (practical)

- practical assessment activity 2 learners plan and mark out component prior to manufacture

Hand Out Assignment 1 TASK 2 Drawing No 2 ROUND FLANGE

P1 part, P2 part,P3 part, P4 part, P5 part, M1 part, M2 part.

Marking out engineering workpieces to specification

Workshop activity – learners marking out: (practical)

- practical assessment activity 3 learners plan and mark out component prior to manufacture

Hand Out Assignment 1 Task 3 Drawing No 3 CAM PLATE

P1 part, P2 part,P3 part, P4 part, P5, M1 part, M2 part.

Topic and suggested assignments/activities

Marking out engineering workpieces to specification

Whole-class teaching to:

- explain importance of leaving the work area in a safe and clean condition
- explain storage of equipment and documentation requirements.

Workshop activity – learners complete worksheets

Hand Out Assignment 2

Written report justifying choices of equipment and techniques used to mark out components D1

Feedback on all assessment tasks and guidance on remedial action if necessary

Unit evaluation and close

Assessment

The centre will devise and mark the assessment for this unit.

Learners must meet all assessment criteria to pass the unit.

It may be possible to integrate the work of this unit with other units in the qualification or to use work-based assessment evidence. The assessment criteria require the learner to carry out three different measuring and marking out activities for different applications including square/rectangular, circular/cylindrical and irregular shapes (note that square/rectangular means either square or rectangular application). For example, marking out a piece of sheet metal for an inspection cut-out and inspection cover location holes, marking out a circular shaft that needs to be drilled through its diameter and marking out a casting for holes to be drilled and tapped to receive a flange. Careful choice of components ensures full coverage of all the learning outcomes, criteria and unit content with just these three tasks. However, in the unlikely situation that this cannot be achieved, then more components could be introduced in either practise or theory as applicable to the criteria and content covered. The preferred approach would be to increase the range of actual marking out exercises carried out by the learner to cover the missing criteria/content item. Choice of the three different applications should also provide for the widest possible coverage of the examples in the unit content. That is, the range of work-holding devices required for the three applications may include for task 1 – the use of a surface plate only; task 2 – surface plate, v-block and clamps; task 3 – surface table, angle plate and clamps or other variations applicable to the task. This should also be applied to the measuring and marking out equipment. Likewise, if sheet metal is chosen for the square/rectangular application then bar stock should be used for the circular/cylindrical application. It would not be acceptable or sufficient to carry out three very similar tasks with similar marking out requirements and similar equipment demands.

To achieve a pass learners should be able to select suitable measuring and marking out methods and equipment for three different applications – square/rectangular, circular/cylindrical and irregular shapes. Learners should then describe the measuring and marking out equipment to be used for these three different applications. Learners must then prepare a work plan for marking out each of the three different applications and mark them out using the prepared work plan. For

each of these tasks to be completed satisfactorily learners should be able to demonstrate safe working practice and good housekeeping at all times.

To achieve a merit grade learners should be able to recommend corrective action for unsafe or defective marking out equipment; this could be for the tools being used or the measuring instruments. Ideally, the evidence would be gathered naturally during work with the three applications and would be captured through a tutor observation record. This record would need to identify the equipment defect and the context within which it occurred plus the corrective action recommended by the learner. However, if this is not appropriate then centres may wish to simulate this by ensuring that a piece of defective marking out equipment is issued to the learner. It will be for centres to determine sufficiency in this and it is not intended that this should be assessed in each of the applications. However, the is trying to determine learners' understanding of the correct function of the equipment and their independence of action when something is not as it should be.

The second merit requires the learner to be able to carry out checks to ensure that the marked out components meet the requirements of the drawing or job description. To be fully achieved, this should be applied to all three applications undertaken by the learner. However, it is expected that if the learner fails to make sufficient checks on the first task but through their development, based on the first assessment feedback, they were then able to demonstrate this level of achievement in the remaining two tasks, then the assessor would be able to make the judgement that the had been achieved. Again, the is about independence and quality of work being the responsibility of the technician and not something that needs to be imposed.

To achieve a distinction grade the learner should be able to justify the choices of datum, work-holding equipment and measurement techniques used to mark out the three different applications. Clearly, this needs to be applied to each task set (application) and is intended to determine the ability of the learner to reflect on the what, why and how of each task. The evidence for this is most likely to be in the form of a critically evaluative write-up of the task undertaken. Success in this should be measured through determining the learner's ability to develop the skills of measurement and marking out through application. If learners are able to give good reasons for and substantiate their actions then they have achieved the highest level of independence expected of this unit at this level. It would be reasonable to assume that whatever marking out tasks these learners were subsequently set they would be able to apply to them this level of analysis and evaluation.

Note:

Merit or distinction achieved on level 2 units will not effect a BTEC level 1 certificate unless the learner is going on to BTEC level 2

Programme of suggested assignments

The table below shows a programme of suggested assignments that cover the pass, merit and distinction criteria in the grading grid. This is for guidance and it is recommended that centres either write their own assignments or adapt any Edexcel assignments to meet local needs and resources.

Criteria covered	Assignment title	Scenario	Assessment method
Assignment 1 Task 1 P1, P2, P3, P4 and P5	Engineering marking out	A practical activity requiring learners to prepare a work plan select suitable measuring and marking out methods and equipment. Carry out marking out activities for three different applications including square/rectangular circular/cylindrical and irregular shapes.	Ideally, the evidence would be gathered naturally during work with the three applications and would be captured through a tutor observation record. A work plan.
Assignment 1 Task 2 M2		A written activity carrying out checks to ensure that the marked out components meet the requirements of the drawing or job.	Completed work log sheet for each task identifying sequence of operation description of equipment, materials used and quality checks.
Assignment 1 Task 3 M1		Activity requiring learners to recommend corrective action for unsafe or defective marking out equipment.	Tutor observation record identifying the equipment defect plus the corrective action recommended by the learner.
Assignment 2 D1	Choices of datum, work holding equipment and measuring techniques	A written activity requiring learners to justify the choices of datum, work-holding equipment and the measurement techniques used.	A report containing a critically evaluative write-up of the task the report will identify problems encountered and suggested improvements.

Links to National Occupational Standards, other BTEC units, other BTEC qualifications and other relevant units and qualifications

This unit forms part of the BTEC Engineering sector suite. This unit has particular links with:

Level 1	Level 2	Level 3
	Unit 2: Interpreting and Using Engineering Information	Unit 2: Communications for Technicians
	Unit 17: Fabrication Techniques and Sheet Metal Work	Unit 16: Engineering Drawing for Technicians

This unit has close links with the NVQ Level 2 Performing Engineering Operations, particularly:

- Unit 1: Working Safely in An Engineering Environment
- Unit 5: Marking Out for Engineering Activities.

Employer engagement and vocational contexts

The use of vocational context is essential in the delivery and assessment of this unit. Learners will require access to workshops equipped with materials and marking out equipment to enable learners to gain a practical awareness and enable them to apply their knowledge and understanding in a practical situation and this could be in the workplace. The use of witness statements enabling the learner to carry out assessment in their own place of work is recommended.

Suggested resources

Books

Timings, R L – *Engineering Fundamentals* (Newnes, 2002) ISBN 0750656093

Tooley, M – *BTEC First in Engineering* (Newnes, 2006) ISBN 0750680601

Functional skills – Level 2

Skill	When learners are ...
Mathematics	
Use appropriate checking procedures and evaluate their effectiveness at each stage	measuring marking out and carrying out checks for accuracy
English	
Speaking and listening – make a range of contributions to discussions and make effective presentations in a wide range of contexts	discussing safe working and good housekeeping practices
Reading – compare, select, read and understand texts and use them to gather information, ideas, arguments and opinions	reading information and drawings for component marking out applications
Writing – write documents, including extended writing pieces, communicating information, ideas and opinions, effectively and persuasively	describing measuring and marking out equipment writing a report justifying the choices of datum work holding and equipment used for marking out applications

13 Further information and useful publications

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

- Edexcel: www.edexcel.com/contactus
- BTEC: www.btec.co.uk/contactus
- Work-based learning: www.pearsonwbl.com/contactus
- Books, software and online resources for UK schools and colleges: www.pearsonschools.co.uk/contactus

Other sources of information and publications available include:

- *Edexcel Equality Policy*
- *Edexcel Information Manual* (updated annually)
- *Reasonable Adjustment and Special Considerations for BTEC and Edexcel NVQ Qualifications*
- *Recognition of Prior Learning Policy*
- *Quality Assurance Handbook* (updated annually)

Publications on the quality assurance of BTEC qualifications are on our website at www.edexcel.com/quals/BTEC/quality/Pages/documents.aspx

Our publications catalogue lists all the material available to support our qualifications. To access the catalogue and order publications, please go to www.edexcel.com/resources/Pages/home.aspx

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 at: www.edexcel.com/resources.

14 Professional development and training

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- building your team and teamwork skills
- developing learner-centred learning and teaching approaches
- building functional skills into your programme
- building in effective and efficient quality assurance systems.

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- **Ask Edexcel:** submit your question online to our Ask Edexcel online service www.edexcel.com/ask and we will make sure your query is handled by a subject specialist.

Annexe A

Mapping with National Occupational Standards

The grid below maps the knowledge covered in the Edexcel BTEC Level 1 Award/Certificate/Diploma in Engineering against the underpinning knowledge of the National Occupational Standards in Level 1 Performing 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	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6	Unit 7	Unit 8	Unit 9	Unit 10	Unit 11	Unit 12	Unit 13	Unit 14	Unit 15	Unit 16	Unit 17	Unit 18	Unit 19	Unit 20	Unit 21	
BTEC Specialist units																						
PEO Level 1 NVQ NOS in Unit 1	#																					
PEO Level 1 NVQ NOS in Unit 4		#	#																			
PEO Level 1 NVQ NOS in Unit 5					#																	
PEO Level 1 NVQ NOS in Unit 7				#																		
PEO Level 1 NVQ NOS in Unit 8				#																		
PEO Level 1 NVQ NOS in Unit 9				#																		
PEO Level 1 NVQ NOS in Unit 10									#													
PEO Level 1 NVQ NOS in Unit 15						#																
PEO Level 1 NVQ NOS in Unit 16						#																
PEO Level 1 NVQ NOS in Unit 17						#																

BTEC Specialist units		Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6	Unit 7	Unit 8	Unit 9	Unit 10	Unit 11	Unit 12	Unit 13	Unit 14	Unit 15	Unit 16	Unit 17	Unit 18	Unit 19	Unit 20	Unit 21
NOS	PEO Level 1 NVQ NOS in Unit 18						#															
	PEO Level 1 NVQ NOS in Unit 20								#													
	PEO Level 1 NVQ NOS in Unit 21																					

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