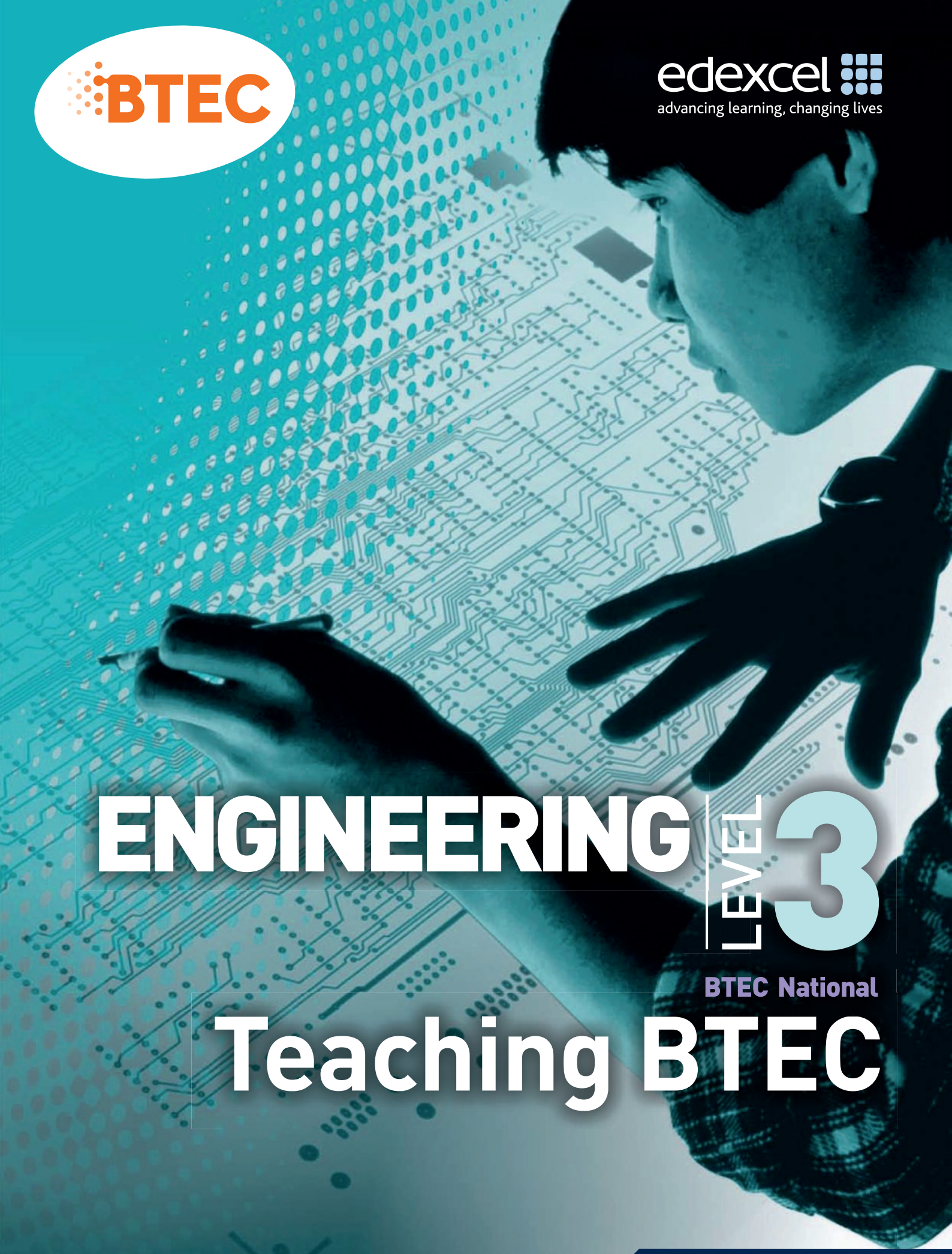

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Copies of official specifications for all Edexcel qualifications may be found on the Edexcel website: www.edexcel.com

Contents

Introduction

This publication supports your delivery of the BTEC Level 3 National Engineering qualifications and should be read in conjunction with the published specification. It provides an overview of how the qualifications have changed, how the BTEC unit specifications should be used, and how best to deliver the course and assess your learners' progress.

These materials are not prescriptive. You may feel that the course can be delivered and assessed more effectively in a different way. This may be because of the way the qualification is organised within your centre or because a different approach better suits your learners, after taking into consideration their learning styles and prior learning. BTEC qualifications are designed to enable you to plan and deliver programmes that are dynamic and relevant to local needs.

Further information and support

For a complete guide to all support offered by Edexcel at every stage of your BTEC delivery, please refer to *BTEC Support*. This booklet is available in your Specification Pack.

What's new for BTEC

Edexcel has redeveloped its suite of BTEC Level 2 First and BTEC Level 3 National qualifications to ensure that they are aligned with the new Qualifications and Credit Framework (QCF). Wherever possible the changes have been minimal and in all cases BTEC units have retained their key characteristics.

What is the Qualifications and Credit Framework?

The Qualifications and Credit Framework (QCF) is a system whereby credit is awarded for qualifications and units (small steps of learning). It enables learners to work towards qualifications at their own pace and along flexible routes.

All QCF units are published on the Register of Regulated Qualifications (RRQ). Every unit and qualification has a credit value showing how much time it takes to complete and a level showing how difficult it is (ranging from Entry Level to Level 8). Learners are given a unique learner number (ULN) where their individual record of credit accumulation is logged. For more information see www.accreditedqualifications.org.uk.

How does this affect the BTEC Level 3 National qualifications?

The new family of BTEC Nationals – which are all at Level 3 – is made up of four sizes of qualification: Certificates, Subsidiary Diplomas, Diplomas and Extended Diplomas. (These qualification names have changed during the revision of BTEC Nationals to meet the QCF structure – please see the table below to compare the new names to the old if you have taught BTEC before.)

The Certificate has been introduced as a new BTEC Level 3 National qualification, to be broadly equivalent to one AS Level. This increases flexibility and improves opportunities for co-teaching with A Levels and other qualification types. The BTEC Level 3 Certificate will be nested wherever possible in the corresponding BTEC Level 3 Subsidiary Diploma, and the BTEC Level 3 Diploma in the corresponding BTEC Level 3 Extended Diploma.

All BTEC Level 3 National qualifications (whether Certificates, Subsidiary Diplomas, Diplomas or Extended Diplomas) comprise a mix of units which can be at different levels but the majority of units must be at the main level of the qualification: Level 3.

Rules of unit combination have been determined to show how learners can select and combine unit choices to achieve new BTEC Level 3 National qualifications (please see the specification for the list of available units). In some cases there will be mandatory units which all learners must take to achieve their qualification.

The overall grade for any BTEC qualification will be based on a table that converts pass, merit or distinction unit grades to points and then totals those points. This table can be found in the specification.

> For full information about these qualification types, rules of unit combination and grading please see the specification.

New features for BTEC units

There are some new features common to all new BTEC units:

- credit level and guided learning hours (GLH)* are stated
- expanded guidance is given on delivery and assessment
- BTEC units now contain guidance and mapping to functional skills and personal, learning and thinking skills (PLTS) – so you can embed learning for these skills
- outline learning plans give suggestions for unit delivery and assessment
- a suggested programme of assignments gives ideas for assignments that will cover the unit's assessment and grading criteria†
- each unit suggests how you can link with employers.

This additional information is not meant to be prescriptive. A key feature of BTEC is that you can match your delivery of the qualifications to local needs and circumstances, and to the opportunities that present in your area to give a real vocational focus. For more information about BTEC units see page 20.

Functional skills

Functional skills have replaced key skills. These are a set of standards that establish a benchmark in English, mathematics and ICT. Functional skills are available from Entry Level to Level 2.

BTEC specifications now offer guidance on how these functional skills can be embedded in your delivery of each unit. Please note: functional skills can be tested while delivering a BTEC course but they are not an integral part of the qualification. They are designed to be assessed by externally set and marked tests.

Personal, learning and thinking skills (PLTS)

BTEC Level 3 National units offer guidance and signposting to help you develop learners' personal, learning and thinking skills. Along with functional skills, these are seen as key elements for success in learning, life and work. Please note that PLTS are not a compulsory or integral component of the BTEC Level 3 National, but should you wish to integrate your PLTS delivery with this qualification we provide this guidance in order to do so.

The PLTS framework consists of six groups of skills:

- independent enquiry (IE)
- creative thinking (CT)
- reflective learning (RL)
- team working (TW)
- self-management (SM)
- effective participation (EP).

These have connected outcome statements (to view these visit **www.qcda.gov.uk**).

Although each skill set is distinctive they may be interconnected and any assignment or learning experience may explore one or more PLTS. BTEC Level 3 National qualifications offer the opportunity to cover PLTS, but in order for learners to recognise this coverage the PLTS would need to be made explicit at delivery. An effective way to record competence in PLTS is by using a tracking system that is linked to the PLTS references in the unit specifications.

WorkSkills

Edexcel has developed a range of WorkSkills qualifications at Entry 3, Level 1 and Level 2 that may be studied alongside BTEC Level 3 Nationals. WorkSkills comprise a range of units that focus on personal development, work, social and domestic skills.

For more information on WorkSkills see **www.edexcel.com/workskills**

So, why choose BTEC?

BTECs are an established and highly successful alternative to general qualifications, suitable for a wide range of learners. As work-related qualifications, they are designed to accommodate the needs of employers as well as allowing progression to university.

By nature BTECs provide a more practical, real-world approach to learning alongside a theoretical background, giving learners the knowledge, understanding and skills that they need to prepare for employment. BTECs also provide career development opportunities for those already in work. They can be taken as well as, or instead of, GCSEs and A levels in schools and colleges.

Comprising individual units, which can be built to form a qualification at a size that is suited to the learner, BTECs can be delivered as a full-time or part-time course. Each unit is assessed through the completion of assignments that are designed by you as tutor and call on a range of evidence types. Such flexibility enables you to deliver a qualification that is just right for your learners and your centre.

	BTEC Level 3 National Qualifications			
	Certificate	**Subsidiary Diploma**	**Diploma**	**Extended Diploma**
Previous name	this is new	Award	Certificate	Diploma
Credits (minimum)	30	60	120	180
Guided learning hours (GLH)	180	360	720	1080
Broad equivalence	1 AS Level	1 A Level	2 A Levels	3 A Levels

***Guided learning hours (GLH)**: all the times when a member of staff (e.g. tutor, trainer or facilitator) is present to give guidance ('contact time'). This includes lessons, lectures, tutorials and supervised study in, for example, learning resource centres and workshops. It also includes time spent with learners, observing and assessing their achievements as they work towards their assignments.

†Every BTEC unit contains an Assessment and Grading Criteria grid. For the purpose of brevity, this will be referred to as the 'grading grid'/'grading criteria' throughout this booklet. In official terms assessment criteria are pass criteria; grading criteria are merit and distinction criteria.

What's new for BTEC Level 3 Nationals in Engineering

Units have been revised and updated so that they can be mapped to the Qualifications and Credit Framework. This table summarises the specification changes, unit by unit. For a complete list of new units, including rules of combination and mandatory/optional unit status, please see the specification.

New units		Old units			Mapping/comments
Number	Name	Number	Name		
Unit 1	Health and Safety in the Engineering Workplace	Unit 7	Health, Safety, Risk Assessment and Welfare in the Engineering Workplace		Full coverage
Unit 2	Communications for Engineering Technicians	Unit 2	Communications for Technicians		Full coverage
Unit 3	Engineering Project	Unit 3	Engineering Project		Full coverage
Unit 4	Mathematics for Engineering Technicians	Unit 4	Mathematics for Technicians		Full coverage
Unit 5	Mechanical Principles and Applications	Unit 5	Electrical and Electronic Principles		Full coverage
Unit 6	Electrical and Electronic Principles	Unit 6	Mechanical Principles and Applications		Full coverage
Unit 7	Business Operations in Engineering	Unit 1	Business Systems for Technicians		Full coverage
Unit 8	Engineering Design	Unit 8	Engineering Design		Full coverage
Unit 9	Commercial Aspects of Engineering Organisations	Unit 9	Commercial Aspects of Organisations Employing Engineers		Full coverage
Unit 10	Properties and Applications of Engineering Materials	Unit 10	Properties and Applications of Engineering Materials		Full coverage
Unit 11	Further Mechanical Principles and Applications	Unit 11	Further Mechanical Principles and Applications		Full coverage
Unit 12	Applications of Mechanical Systems in Engineering	Unit 12	Applications of Mechanical Systems in Engineering		Full coverage
Unit 13	Principles and Applications of Fluid Mechanics	Unit 13	Principles and Applications of Fluid Mechanics		Full coverage
Unit 14	Principles and Applications of Thermodynamics	Unit 14	Principles and Applications of Thermodynamics		Full coverage
Unit 15	Electro, Pneumatic and Hydraulic Systems and Devices	Unit 15	Electro, Pneumatic and Hydraulic Systems and Devices		Full coverage
Unit 16	Engineering Drawing for Technicians	Unit 16	Engineering Drawing for Technicians		Full coverage
Unit 17	Computer Aided Drafting in Engineering	Unit 17	Computer Aided Drafting		Full coverage
Unit 18	Advanced Mechanical Principles and Applications	Unit 18	Advanced Mechanical Principles and Applications		Full coverage
Unit 19	Mechanical Measurement and Inspection Techniques	Unit 19	Mechanical Measurement and Inspection Techniques		Full coverage
Unit 20	Engineering Primary Forming Processes	Unit 20	Engineering Primary Forming Processes		Full coverage
Unit 21	Engineering Secondary and Finishing Techniques	Unit 21	Engineering Secondary/Finishing Processes		Full coverage
Unit 22	Fabrication Processes and Technology	Unit 22	Fabrication Processes and Technology		Full coverage
Unit 23	Welding Technology	Unit 23	Applications of Welding Technology		Full coverage
Unit 24	Industrial Process Measurement	Unit 24	Industrial Process Measurement		Full coverage
Unit 25	Selecting and Using Programmable Controllers	Unit 25	Selection and Applications of Programmable Logic Controllers		Full coverage
Unit 26	Applications of Computer Numerical Control in Engineering	Unit 26	Computer Numerical Control of Machine Tools		Full coverage
Unit 27	Welding Principles	Unit 27	Welding Principles		Full coverage
Unit 28	Further Mathematics for Technicians	Unit 28	Further Mathematics for Technicians		Full coverage
Unit 29	Manufacturing Planning	Unit 29	Manufacturing Planning		Full coverage
Unit 30	Setting and Proving Secondary Processing Machines	Unit 30	Setting and Proving Secondary Processing Machines		Full coverage
Unit 31	Computer Aided Manufacturing	Unit 31	Computer Aided Manufacturing		Full coverage

New units		Old units			Mapping/comments
Number	Name	Number	Name		
Unit 32	Production System Design	Unit 32	Production System Design		Full coverage
Unit 33	Six Sigma Quality	Unit 33	Six Sigma Quality		Full coverage
Unit 34	Electronic Circuit Design and Manufacture	Unit 34	Electronic Circuit Manufacture		Full coverage
Unit 35	Principles and Applications of Electronic Devices and Circuits	Unit 35	Principles and Applications of Electronic Devices and Circuits		Full coverage
Unit 36	Mechanical and Thermal Treatment of Metals	Unit 36	Mechanical and Thermal Treatment of Metals		Full coverage
Unit 37	Structure and Properties of Metals	Unit 37	Structure and Properties of Metals		Full coverage
Unit 38	Industrial Alloys	Unit 38	Industrial Alloys		Full coverage
Unit 39	Metallurgical Techniques	Unit 39	Metallurgical Techniques		Full coverage
Unit 40	Extraction and Refining of Metals	Unit 40	Extraction and Refining of Metals		Full coverage
Unit 41	Liquid Metal Casting Processes	Unit 41	Liquid Metal Processing		Full coverage
Unit 42	Quality and Business Improvement	Unit 41	Quality and Business Improvement		Full coverage
Unit 43	Teamwork in a Continuous Improvement Environment	Unit 43	Teamwork in a Continuous Improvement Environment		Full coverage
Unit 44	Engineering Maintenance Procedures	Unit 44	Engineering Maintenance Procedures and Techniques		Full coverage
Unit 45	Monitoring and Fault Diagnosis of Engineering Systems	Unit 45	Monitoring and Fault Diagnosis of Engineering Systems		Full coverage
Unit 46	Principles and Applications of Engineering Measurement Systems	Unit 46	Principles and Applications of Engineering Measurement Systems		Full coverage
Unit 47	Industrial Plant and Process Control	Unit 48	Industrial Plant and Process Control		Full coverage
Unit 48	Function and Characteristics of Railway Signalling Systems	Unit 49	Function and Characteristics of Railway Signalling Systems		Full coverage
Unit 49	Installing and Commissioning Engineering Equipment	Unit 50	Installing and Commissioning Engineering Equipment		Full coverage
Unit 50	Industrial Process Controllers	Unit 51	Industrial Process Controllers		Full coverage
Unit 51	Electrical Technology	Unit 52	Electrical Technology		Full coverage
Unit 52	Electrical Installation	Unit 53	Electrical Installation		Full coverage
Unit 53	Electronic Measurement and Testing	Unit 54	Electronic Measurement and Testing		Full coverage
Unit 54	Electronic Measurement and Testing	Unit 55	Electronic Measurement and Testing		Full coverage
Unit 55	Railway Signalling Systems Testing and Maintenance	Unit 56	Installing, Commissioning, Testing and Maintenance of Railway Signalling Systems		Full coverage
Unit 56	Railway Infrastructure Construction and Maintenance	Unit 59	Railway Infrastructure Construction and Maintenance		Full coverage

Getting started: planning course delivery

Good planning is the first step to successful BTEC delivery and assessment. It is the best way of making sure everything is in place and that your unit coverage is robust and achievable. This guide should help you get started.

First things first

- Understand the structure of a BTEC unit (see page 20).
- Read and understand the specification.
- Decide whether you will teach unit by unit or if it is best to integrate unit delivery (for further guidance on this see page 16).
- Plan your programme of assignments (see page 34).

Key areas to consider

- Resource planning, such as when you might need to call on the expertise of specialist staff.
- Timetabling, events, guest speakers, visits to industry and exhibitions.
- Interim and major assessment points.
- Planning for internal verification.

The BTEC assessment and delivery process

*Lead internal verifiers who have passed the OSCA2 test can seek certification of learner work for the programme(s) they manage without annual external sampling. (Some centres may be randomly sampled.)

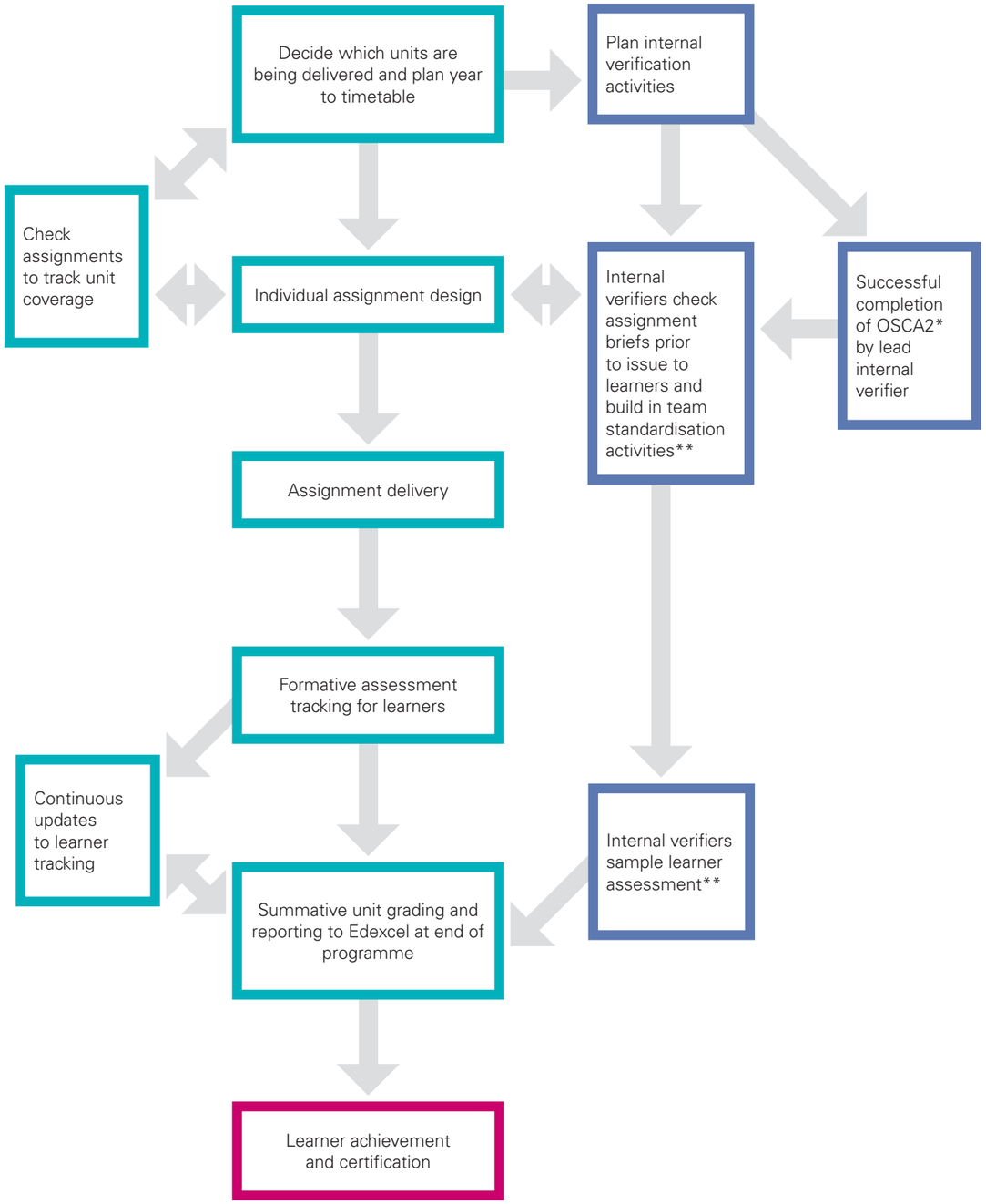
Overview of roles and responsibilities

	Tutors/assessors		Learners	Internal verifiers†	Programme managers/ heads of department
Planning	Read the specification Work with colleagues in their department, planning the course as a team Design assignments which are suited to local and learner needs and matched to unit grading criteria Action the internal verifier's advice on planning		Manage and organise their own time to prepare evidence for assignments	Support programme planning Arrange standardisation meetings across teams and multi-sites Ensure an effective system for recording learner achievement is in place Advise programme team on any training needs	Manage the team to devise assessment programme in collaboration with tutors (assessors) and internal verifier(s) Prepare resources plan to match assignment programme Manage timetable and room allocation Organise a tracking mechanism for learner achievement
Implementing	Deliver unit content and assignments Guide learners towards approaches in gathering assessment evidence Complete observation and witness statements to support demonstration of practical skills Observe, scrutinise and record evidence of individual work within group activities Review progress of learners to give opportunities for achieving grading criteria Award unit grades when the unit has been completed and internally verified		Participate fully in learning Produce work for assessment	Provide advice and support to assessors on regular basis Advise on opportunities for evidence generation and collection Advise on the appropriateness of assessment evidence with regard to level, sufficiency, authenticity, validity and consistency Advise on the interpretation of national standards and undertake standardisation exercise Keep records of the verification process Liaise with Edexcel Assessment Associate where appropriate	Take part in the programme Monitor delivery Organise regular team meetings Coordinate tutor/assessor activity Liaise with the internal verifier(s) and lead internal verifier(s) Deal with learner issues Oversee maintenance of learner record
Internal Verifying	Action internal verifier's advice on assignment design Check authenticity and sufficiency of assessment evidence produced against grading criteria/unit content Record assessment decisions and put these forward for internal verification Action internal verifier's advice on grading decisions		Check the validity and sufficiency of the evidence with the assessor Review opportunities for achieving grading criteria Participate in self and peer assessment activities where appropriate	Check if assignments are fit for purpose Use their subject specialism to sample assignments to check the quality of assessment and to ensure that it is consistent, fair and reliable Ensure own assessment decisions are sampled when teaching on the programme	Collaborate with internal verifier(s) and lead internal verifier(s) to maintain the programme Check the validity of overall verification programme Coordinate awarding body requirements Update internal verifier team on current practice Respond to any awarding body action
Feedback	Give constructive feedback to learners and record learners' formative achievements Provide guidance for learners to enhance achievement Plan next steps with learners Record learners' summative achievements		Receive assessment recommendations and feedback from the assessor Plan next steps with the assessor	Give decisions and feedback on the sampling Ensure appropriate corrective action is taken where necessary Provide feedback on aspects of the assessment system to the programme team, senior management and Edexcel Take part in the formal stages of any appeal	Coordinate and contribute to final internal awarding meetings Oversee recording and transmission of accurate results Review the course for the year with an end of year report including resource and teaching evaluation Plan for the next academic year

This is you

†Some of these functions may be undertaken by the lead internal verifier (see page 40).

Overview of year



*OSCA2 is the online standardisation test that would give a lead internal verifier, and consequently the programme(s) they manage, accredited status. With this status a lead internal verifier can seek certification of learners' work during the period of that accreditation without annual external sampling. (Some centres may be randomly sampled.)

**Where the centre has a lead internal verifier who has passed the OSCA2 test, this process is coordinated by them.

Learner induction

It is crucial that you familiarise your learners with how BTEC delivery and assessment work. Consider developing learners' understanding of:

- the specification (structure, content, grading grids, level of programme and equivalency)
- the purpose of the assignment briefs
- the relationship between the tasks given in an assignment and the grading criteria
- the way that the BTEC grading grids work in relation to their prior experience of other assessment models
- internal assessment procedures and centre policies
- the concept of deadlines and hand-in dates
- the concept of vocational and work-related learning
- learner responsibility.

Setting expectations

It is common practice to provide induction books for learners to sign at the beginning of the programme. These could set out your centre's expected rules and recommendations, for example adherence to health and safety legislation, and your centre's plagiarism policy (for more information see page 22). These could also contain rules and procedures about the facilities learners will use.

You might decide to show your new learners some work from previous years. This will give them a realistic idea of what is required and how assessment is carried out for a unit. This will take away some of the fear of assessment.

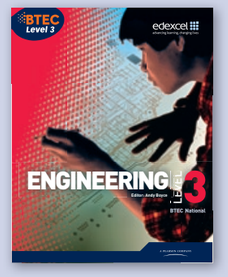
Progression

It is your duty to provide learners with clear guidance on possible progression routes that are relevant to their abilities. Some Level 3 learners will need to spend time researching and visiting potential Higher Education centres to confirm their progression choices.

An example of a progression route from the BTEC Level 3 National is a Foundation Degree in Mechanical Engineering, studied on a part-time basis over three years. This could then be followed by a two or three year top-up programme to a full BSc in Engineering. An FE college will usually have links with a university so that Degree programmes can be delivered on a partnership basis. Many senior engineering designers have followed this type of progression route before seeking registration as Chartered Engineers.

The full academic route is not for everyone and a good number of learners decide to become technicians on completion of the BTEC National. They might decide to work as a technician in a test laboratory or as a quality assurance technician in a manufacturing area. Both jobs would involve further specialist training.

Edexcel's Study Skills Guides



Edexcel publishes free Study Skills Guides for BTEC Level 3 National learners. These provide guidance on:

- self-assessment of strengths so learners can identify the best way for them to learn
- time management
- getting the most from work experience and special events
- working with others
- finding and using resources
- organising, interpreting and presenting information
- making presentations
- tackling assignments (including a worked assignment from a learner perspective).

External links

All work-related programmes benefit from external links with the vocational sector. These links could be developed in many ways:

- provision of 'live' case study material that is company or organisation based
- learner visits to vocational settings
- professional input from practitioners, especially where vocational expertise is clearly identified in the delivery section of the units
- work placements that are specifically related to the qualification
- tutor placements to enhance vocational expertise
- use of vocational language and skills regularly in class, and in assignments
- setting assignments within a strong vocational context, such as investigating the business operation of a local engineering company.

Keeping up to date

Learners should be encouraged to read relevant trade journals, such as *Everyday Practical Electronics, Electrical Review, The Engineer on line, The Institute of Materials, Minerals and Mining (IOM3) journal.* It is also worth watching television programmes about engineering.

Career opportunities

Throughout the course, it is important that learners are informed of the career opportunities that exist within the engineering industry. The range of career opportunities is huge and includes:

- research
- design engineering
- manufacturing
- quality assurance
- project management
- development and testing
- marketing
- customer services
- business management
- materials development

Work experience

Work experience should be relatively easy to arrange if strong links are developed with local engineering businesses. There are several ways to establish these links:

- Invite people from industry to join the programme committee so that they can sit in on planning and review meetings.
- Set up an engineering employers' forum and hold a review meeting each term.
- Forge close links with training managers and advise them when they take on new apprentices. Prospective learners could be given diagnostic tests and the results discussed with training managers.
- Invite engineers from local industry to help with unit delivery as guest presenters.
- Set up a mentoring scheme between learners and engineers who have previously studied BTEC National and Higher qualifications at your centre.
- Set up a forum with a professional engineering institution so that people from local industry and college can meet informally to discus topics of interest and/or listen to guest speakers.
- Be pro-active in offering help and technical advice to local businesses, particularly small ones with limited resources, such as carrying out materials testing for them if they do not have the proper equipment.

It really is important to develop robust links because the evidence required for some learner assignments is best generated from good work experience or through learners' part-time work.

Good teaching practice and resources

Staffing

All staff must be appropriately qualified to teach this course. Many tutors delivering the BTEC Nationals in Engineering are qualified in the subject area and have relevant vocational experience. Tutors should have subject-specific knowledge for the unit(s) that they deliver.

Familiarity with current professional practice

It is important to have knowledge of current professional practice in order to set standards within each specialist area. It is a feature of the design of BTEC qualifications that they have the flexibility to respond to National Occupational Standards in each area as current practice changes. They also offer the opportunity for innovative approaches to teaching and learning.

Additional specialist practitioners

You may employ specialist practitioners, taking care that legal requirements are met. Where external tutors are delivering units, the internal verifier should carry out close monitoring to help ensure the quality of the assignment process.

Awareness of learners requiring reasonable adjustment

Be aware of individual requirements and ensure that learners can achieve the unit grading criteria in all of the units that the planned programme contains. You are free to make adjustments to programme delivery to ensure that learners can be guaranteed to gain the qualification if they comply with all unit grading demands (see more information about reasonable adjustment in the panel below).

What are reasonable adjustments?

Reasonable adjustments are arrangements which give a learner access to a qualification. Reasonable adjustments must be agreed at the pre-assessment planning stage and comprise any action that helps to reduce the effect of a disability or difficulty, which places the learner at a substantial disadvantage in the assessment situation. For example, these actions might involve changing or adapting the assessment method, adapting assessment materials or using assistive technology. Reasonable adjustments must not affect the reliability or validity of assessment outcomes and they must not give the learner an assessment advantage over other learners undertaking the same or similar assessments.

How do I apply for a reasonable adjustment for internally assessed BTEC qualifications?

For BTEC qualifications that are internally assessed centres do not need to apply to Edexcel to implement a reasonable adjustment. However, centres must only make reasonable adjustments in line with Edexcel policy and keep a record on Form RA1, which can be found on the Edexcel website.

Learning resources

It is essential that there is a range of current resource material to support the programme such as textbooks, videos, magazines, journals, other publications and access to websites.

Sufficient resources to meet the number of learners

Your centre signs a commitment to ensure adequate provision as part of the approval process. This must be adhered to in all cases so that learners are guaranteed the very best provision a centre can provide. Ongoing Edexcel quality assurance processes will check that the centre has sufficient resources to support the delivery of the programme and that the centre has made provision to meet any specialist resource requirements at the approval stage.

Where resources are shared, carefully assess, plan and determine the access demands of all programmes within your subject area.

An engineering base room is desirable

Try to ensure that the learners have a base room where their work can be displayed along with other relevant engineering and technology posters. If there is a value placed on where learners work, they are more likely to engage with the programme.

The base room needs to be spacious enough for learning resources to be housed, including books, engineering journals and profiles of local, national and international engineering businesses.

Design of space appropriate to activities

For engineering programmes learners need access to teaching class rooms with multimedia and computing facilities, laboratories and workshops.

Timetabling ICT to develop research skills

Careful timetabling should always be undertaken to maximise learners' opportunities with IT equipment in order to facilitate independent research skills.

Access to specialist facilities, for example computing and materials testing

Optional unit choices should be made with care. Check the content for every unit to ensure that your resources are adequate in terms of physical equipment and appropriate technology and that you have access to well trained staff.

If equipment resources are judged to be inadequate it is worth investigating whether another department at the centre or a local university can help out. Local employers may also be able to help, particularly where they have invested heavily in new equipment and want to showcase it.

Tutorials, individual learning plans and individual study time

Many learners cannot work in their own time at home for a variety of reasons. If you are able to offer additional access or can allocate time for independent learning, this can enhance learner development and allow achievement at merit and distinction levels.

You will need to track each learner's progress and spend at least a session per term on a one-to-one basis so you can see if any difficulties are arising with assignments and progress, and adjust deadlines as appropriate.

You will find that learners at this level and age group will want to complete all of the assessment during their time at your institution, and you should therefore plan for this within your scheme of work.

Health, safety and environmental issues in classrooms, IT laboratories and off-site visits

You should consider health, safety and environmental issues in relation to work spaces. Take personal responsibility for health and safety and conduct risk assessments for all activities and classrooms. Report concerns.

Awareness of legislation within vocational practice

Make learners aware of any relevant legislation for vocational practice. Learners can endanger themselves or others if they do not know and understand what is required. Be sure that you are aware of any new or pending legislation that could impact on practice.

Planning unit delivery

BTEC qualifications are designed to be flexible in their delivery and assessment, giving you the opportunity to construct and deliver programmes to suit your resources and learners. There are two main methods of approaching BTEC delivery: single unit delivery or integrated delivery.

Single unit delivery

BTEC qualifications comprise individual units that represent clusters of learning outcomes. For many sectors, a unit-by-unit approach to delivery is a valid and appropriate method for meeting the learning outcomes and delivering the unit content within the specification. Vocational applications of knowledge gained through unit-by-unit assignments allow learners reflect on their practice, resulting in focused and in-depth evaluations.

Integration of units

For some sectors, however, it is essential that learners know how the content covered by several units interrelates, as it would in the world of work. In these sectors unit delivery is best integrated, with assignment evidence mapped across two or more units. Integrated delivery is one of the distinct strengths of BTEC qualifications and can lead to a deeper practical and vocational understanding of the content.

Delivery of units for BTEC Level 3 Nationals in Engineering

Synergy between a number of the BTEC National units provides scope for partial integration of your delivery. For example, Unit 7 (Business Operations in Engineering) and Unit 9 (Commercial Aspects of Engineering Organisations) have overlapping content relating to the operation and management of engineering businesses.

For Level 3 engineering programmes you should try as far as possible to create links across units – for example, between the mathematics and mechanical/electrical principles and applications units. Many learners will try to see the units in isolation and need to be reminded that in the real world of engineering there is always a large amount of integration, for example between design, manufacturing and marketing operations. Specific guidance on synergy between units is provided in the unit specifications.

For information on how to design assignments that cover one or more units please see page 36. Information on tracking delivery – suitable for both a single unit and an integrated approach – can be found on page 19.

Linking theory and practice in assessment

By encouraging your learners to refer to the work of others, you will help them to integrate theoretical research into their practical assignments. At Level 3 learners can conduct research with real businesses which can be facilitated through work experience, part-time jobs or by accessing businesses where their parents or relatives may work. Where no research opportunities exist then learners should be given case studies.

Referencing

Encourage learners to adopt formal referencing in their work. It is always valuable for learners to be able to return to useful sources, so encourage them to keep good records or notes. Try to make referencing a matter of course by the end of the programme, as this prepares learners for progression onto higher programmes where referencing may be mandatory. It is worth introducing learners to a recognised system such as the Harvard method.

Making presentations

At an early stage in the programme, encourage learners to make presentations to other members of the class and ensure that they work in groups as frequently as possible. These are very important skills that the BTEC programmes have been successful in developing, and which will certainly be beneficial at work and in higher education.

Selecting the right units

- Look to the specification for information on which units are mandatory and which are optional, and the specific rules of unit combination for each qualification (Certificate, Subsidiary Diploma, Diploma, Extended Diploma).
- Consider which units your centre is best equipped to deliver (consider staffing, expertise, resources).
- Give learners a choice of units so they might follow a course that is appropriate to their needs, abilities and interests.

A suggested course structure

The tables below provide suggestions as to how you might choose to structure a BTEC Level 3 National Engineering course. Refer to the specification to check other optional units available and to view rules of unit combination. It is key that you make unit choices that are relevant and appropriate for your learners and centre resources.

When it comes to the **Diploma** and **Extended Diploma** it is possible for learners to follow one of three pathways:

- Manufacturing Engineering
- Mechanical Engineering
- Operations and Maintenance Engineering

Look to the specification for full information on the mandatory and optional units that could be combined for a qualification along one of these more specialist pathways.

The choice of pathways offered by a centre depends on a number of factors, for example:

- the requirements of local industry
- physical resources
- being able to combine groups for common units
- progression onto Higher Education
- the financial viability of the proposed programme.

BTEC Level 3 National Certificate in Engineering:
Three mandatory units for a combined total of 30 credits

Year 1		
Term 1	**Term 2**	**Term 3**
Unit 1: Health and Safety in the Engineering Workplace (10 credits, mandatory)	Unit 2: Communications for Engineering Technicians (10 credits, mandatory)	Unit 4: Mathematics for Engineering Technicians (10 credits, mandatory)

BTEC Level 3 National Subsidiary Diploma in Engineering:
Five mandatory units for a combined total of 60 credits

Year 1		
Term 1	**Term 2**	**Term 3**
Unit 1: Health and Safety in the Engineering Workplace (10 credits, mandatory) Unit 4: Mathematics for Engineering Technicians (10 credits, mandatory)	Unit 2: Communications for Engineering Technicians (10 credits, mandatory) Unit 5: Mechanical Principles and Applications (10 credits, mandatory)	Unit 3: Engineering Project (20 credits, mandatory)

BTEC Level 3 National Diploma in Mechanical Engineering:
Five mandatory units plus optional units for a combined total of 120 credits

Year 1		
Term 1	**Term 2**	**Term 3**
Unit 1: Health and Safety in the Engineering Workplace (10 credits, mandatory) Unit 4: Mathematics for Engineering Technicians (10 credits, mandatory)	Unit 2: Communications for Engineering Technicians (10 credits, mandatory) Unit 5: Mechanical Principles and Applications (10 credits, mandatory)	Unit 3: Engineering Project (20 credits, mandatory)
Year 2		
Term 4	**Term 5**	**Term 6**
Unit 8: Engineering Design (10 credits, optional, group A) Unit 10: Properties and Applications of Engineering Materials (10 credits, optional, group A)	Unit 7: Business Operations in Engineering (10 credits, optional, group A) Unit 17: Computer Aided Drafting in Engineering (10 credits, optional, group A)	Unit 20: Engineering Primary Forming Processes (10 credits, optional, group B) Unit 22: Fabrication Processes and Technology (10 credits, optional, group B)

BTEC Level 3 National Extended Diploma in Mechanical Engineering:
Five mandatory units plus optional units for a combined total of 180 credits

Year 1		
Term 1	**Term 2**	**Term 3**
Unit 1: Health and Safety in the Engineering Workplace (10 credits, mandatory) Unit 4: Mathematics for Engineering Technicians (10 credits, mandatory) Unit 7: Business Operations in Engineering (10 credits, optional, group A)	Unit 2: Communications for Engineering Technicians (10 credits, mandatory) Unit 5: Mechanical Principles and Applications (10 credits, mandatory) Unit 16: Engineering Drawing for Technicians (10 credits, optional, group A)	Unit 3: Engineering Project (20 credits, mandatory) Unit 10: Properties and Applications of Engineering Materials (10 credits, optional, group A)
Year 2		
Term 4	**Term 5**	**Term 6**
Unit 9: Commercial Aspects of Engineering Organisations (10 credits, optional, group A) Unit 11: Further Mechanical Principles and Applications (10 credits, optional, group A) Unit 20: Engineering Primary Forming Processes (10 credits, optional, group B)	Unit 12: Applications of Mechanical Systems in Engineering (10 credits, optional, group A) Unit 17: Computer Aided Drafting in Engineering (10 credits, optional, group A) Unit 21: Engineering Secondary and Finishing Processes (10 credits, optional, group B)	Unit 8: Engineering Design (10 credits, optional, group A) Unit 15: Electro, Pneumatic and Hydraulic Systems and Devices (10 credits, optional, group A) Unit 19: Mechanical Measurement and Inspection Techniques (10 credits, optional, group B)

Note: There are 17 units to be delivered for the Extended Diploma. In this example complete units are delivered in single terms, but there is no reason why the units should not be run across three terms, particularly where there is synergy between them, such as CAD, Engineering Design and Secondary/Finishing Processes, which complement each other. The order and timing of delivery will depend on centre resources and staff availability. Optional units can be taught at the beginning of year one if desired, but should be carefully planned so that learners cover relevant content of mandatory units which may feature in the optional unit.

Can I co-teach BTEC with GCE A Levels?

- There may be opportunities to co-teach BTEC Nationals with GCEs however it is important that there is clear differentiation between BTEC assignments and work, and GCE coursework.
- You must ensure that the work produced meets the BTEC unit content requirements and that sufficient coverage is not compromised.
- Remember: assessment for BTEC should be undertaken within a vocational context and must fulfil the unit grading criteria.
- Where there are a number of assessors working on a BTEC programme, they should be involved in standardisation exercises to ensure consistency of assessment decision making.
- There must be a robust and effective internal verification process in place.

For more information about BTEC assessment and internal verification, please see pages 34 onwards.

Keeping track

Whatever decisions you make about your programme delivery, it is important that you carefully map the assessment of criteria across units and keep accurate records to track learner achievement. Tracker sheets like those shown opposite can be constructed easily in Word or Excel. The ones opposite are available on the CD-ROM that is provided in your Specification Pack.

Systematically track all of your assignments at grading criterion level so that you build a full and complete achievement record for every learner. This is especially important in differentiated learning or in special circumstances such as illness where all assignments might not be carried out. In these cases, full unit coverage can sometimes be achieved through cross-reference with other related units, but evidence provided by learners must fully cover the criteria.

Many centres are making use of virtual learning environments (VLEs) such as Blackboard or Moodle that allow tutors to maintain individual learner sites and keep work electronically. You may decide to give parents access so that they too can check learner progress and achievement. This kind of service will help parents to understand how BTECs are assessed.

Suggested learner tracking sheet

Learner name	Unit name												Unit name											
	P1	P2	P3	P4	M1	M2	M3	M4	D1	D2	D3	D4	P1	P2	P3	P4	M1	M2	M3	M4	D1	D2	D3	D4

Suggested assignment tracking sheet (for integrated unit delivery with different tutors delivering each unit)

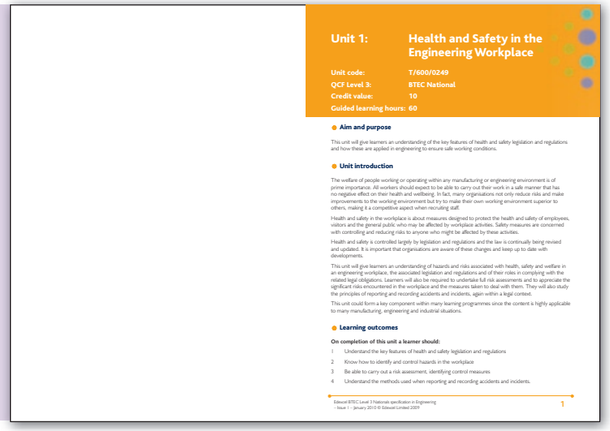
Assignment name	Unit name												Unit name											
	Tutor name												Tutor name											
	P1	P2	P3	P4	M1	M2	M3	M4	D1	D2	D3	D4	P1	P2	P3	P4	M1	M2	M3	M4	D1	D2	D3	D4

BTEC units: a quick overview

Every BTEC unit is structured in exactly the same way, and this structure has been developed to facilitate your delivery of the course. The notes here give a quick overview. For full details of this structure please see the specification.

Title page

The first page of the specification gives the unit title, QCF level, the credit value and the guided learning hours (GLH)*. It also sets out the unit aim and purpose, the unit introduction and the learning outcomes.



Unit 1: Health and Safety in the Engineering Workplace

Unit code: T/600/0249
QCF Level 3: BTEC National
Credit value: 10
Guided learning hours: 60

Aim and purpose

This unit will give learners an understanding of the key features of health and safety legislation and regulations and how these are applied in engineering to ensure safe working conditions.

Unit introduction

The welfare of people working or operating within any manufacturing or engineering environment is of prime importance. All workers should expect to be able to carry out their work in a safe manner that has no negative effect on their health and wellbeing. In fact, many organisations not only reduce risks and make improvements to the working environment but try to make their own working environment superior to others, making it a competitive aspect when recruiting staff.

Health and safety in the workplace is about measures designed to protect the health and safety of employees, visitors and the general public who may be affected by workplace activities. Safety measures are concerned with controlling and reducing risks to anyone who might be affected by these activities.

Health and safety is controlled largely by legislation and regulations and the law is continually being revised and updated. It is important that organisations are aware of these changes and keep up to date with developments.

This unit will give learners an understanding of hazards and risks associated with health, safety and welfare in an engineering workplace, the associated legislation and regulations and of their roles in complying with the related legal obligations. Learners will also be required to undertake full risk assessments and to appreciate the significant risks encountered in the workplace and the measures taken to deal with them. They will also study the principles of reporting and recording accidents and incidents, again within a legal context.

This unit could form a key component within many learning programmes since the content is highly applicable to many manufacturing, engineering and industrial situations.

Learning outcomes

On completion of this unit a learner should:

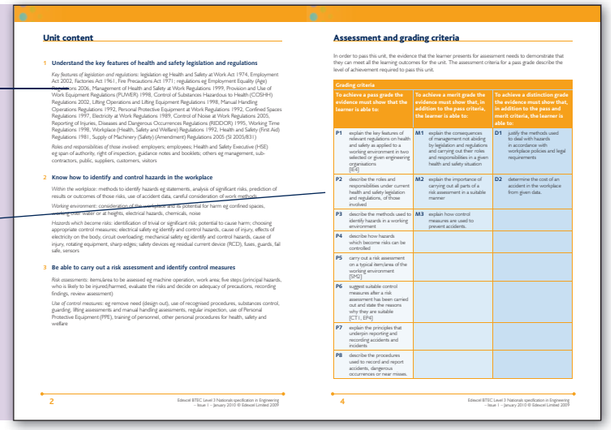
1 Understand the key features of health and safety legislation and regulations
2 Know how to identify and control hazards in the workplace
3 Be able to carry out a risk assessment, identifying control measures
4 Understand the methods used when reporting and recording accidents and incidents.

Unit content

Lists the breadth of knowledge, skills and understanding needed to achieve each of the learning outcomes. This outlines what you should cover in your delivery and what your learners need to know.

Assessment and grading criteria grid

The evidence that each learner must produce to achieve pass, merit or distinction. **This is the most important section of each unit** – units must be taught and assessed by these criteria (not the learning outcomes).



Unit content

1 Understand the key features of health and safety legislation and regulations

Key features of legislation and regulations: legislation eg Health and Safety at Work Act 1974, Employment Act 2002, Factories Act 1961, Fire Precautions Act 1971; regulations eg Employment Equality (Age) Regulations 2006, 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, Lifting Operations and Lifting Equipment Regulations 1998, Manual Handling Operations Regulations 1992, Personal Protective Equipment at Work Regulations 1992, Confined Spaces Regulations 1997, Electricity at Work Regulations 1989, Control of Noise at Work Regulations 2005, Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (RIDDOR) 1995, Working Time Regulations 1998, Workplace (Health, Safety and Welfare) Regulations 1992, Health and Safety (First Aid) Regulations 1981, Safety of Machinery (Safety Component) Regulations 2008 (SI 2005/831)

Roles and responsibilities of those involved: employers; employees; Health and Safety Executive (HSE) eg span of authority, right of inspection, guidance notes and booklets; others eg management, sub-contractors, public, suppliers, customers, visitors

2 Know how to identify and control hazards in the workplace

Within the workplace: methods to identify hazards eg statements, analysis of significant risks, prediction of results or outcomes of those risks, use of accident data, careful consideration of work methods

Working environment: consideration of the environment for potential for harm eg confined spaces, working under water at heights, electrical hazards, chemicals, noise

Hazards which become risks: identification of trivial or significant risk; potential to cause harm; choosing appropriate control measures; electrical safety eg identify and control hazards, cause of injury, effects of electricity on the body, circuit overloading; mechanical safety eg identify and control hazards, cause of injury, rotating equipment, sharp edges, safety devices eg residual current device (RCD), fuses, guards, fail safe, sensors

3 Be able to carry out a risk assessment and identify control measures

Risk assessments: items/tasks to be assessed eg machine operation, work area; five steps (principal hazards, who is likely to be injured/harmed, evaluate the risks and decide on adequacy of precautions, recording findings, review assessment)

Use of control measures: eg remove need (design out), use of recognised procedures, substances control, guarding, lifting assessments and manual handling assessments, regular inspection, use of Personal Protective Equipment (PPE), training of personnel, other personal procedures for health, safety and welfare

Assessment and 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 assessment criteria for a pass grade describe the level of achievement required to pass this unit.

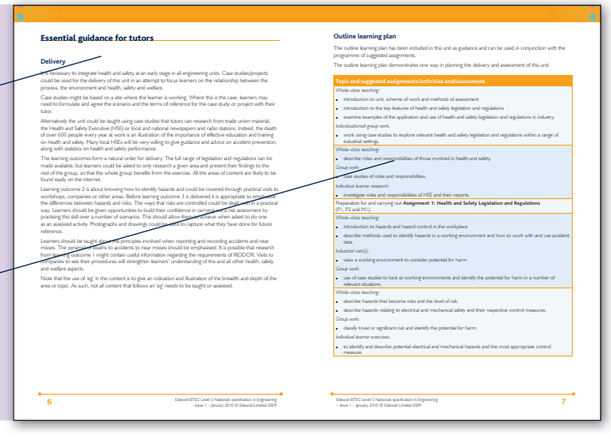
Grading criteria			
To achieve a pass grade the evidence must show that the learner is able to:		**To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:**	**To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:**
P1 explain the key features of relevant legislation on health and safety as applied to a working environment in two selected or given engineering organisations [LO1]		**M1** explain the consequences of non-agreement not abiding by legislation and regulations and carrying out their roles and responsibilities in a given health and safety situation	**D1** justify the methods used to deal with hazards in accordance with workplace policies and legal requirements
P2 describe the roles and responsibilities under current health and safety legislation and regulations, of those involved		**M2** explain the importance of carrying out all parts of a risk assessment in a suitable manner	**D2** determine the cost of an accident in the workplace from given data.
P3 describe the methods used to identify hazards in a working environment		**M3** explain how control measures are used to prevent accidents.	
P4 describe how hazards which become risks can be controlled			
P5 carry out a risk assessment on a typical item/area of the working environment [SM2]			
P6 suggest suitable control measures after a risk assessment has been carried out and state the reasons why they are suitable [CT1, EP6]			
P7 explain the principles that underpin reporting and recording accidents and incidents			
P8 describe the procedures used to record and report accidents, dangerous occurrences or near misses.			

Essential guidance for tutors

Unit-specific guidance on delivery and assessment.

Outline learning plan

This suggests **one way** you could deliver the unit. Design your own learning plan to mirror your preferred delivery and assessment methods for unit coverage. (This will be crucial where a more integrated delivery profile is adopted.)



Essential guidance for tutors

Delivery

It is necessary to integrate health and safety at an early stage in all engineering units. Case studies/projects could be used for the delivery of this unit in an attempt to focus learners on the relationship between the process, the environment and health, safety and welfare.

Case studies might be based on a site where the learner is working. Where this is the case, learners may need to formulate and agree the scenario and the terms of reference for the case study or project with their tutor.

Alternatively the unit could be taught using case studies that tutors can research from trade union material, the Health and Safety Executive (HSE) or local and national newspapers and radio stations. Indeed, the death of over 600 people every year at work is an illustration of the importance of effective education and training on health and safety. Many local HSEs will be very willing to give guidance and advice on accident prevention, along with statistics on health and safety performance.

The learning outcomes form a natural order for delivery. The full range of legislation and regulations can be made available, but learners could be asked to only research a given area and present their findings to the rest of the group, so that the whole group benefits from the exercise. All the areas of content are likely to be found easily on the internet.

Learning outcome 2 is about knowing how to identify hazards and could be covered through practical visits to workshops, companies or other areas. Before learning outcome 3 is delivered it is appropriate to consider the differences between hazards and risks. The ways that risks are controlled could be dealt with in a practical way. Learners should be given opportunities to build their confidence in carrying out risk assessment by practising this skill over a number of scenarios. This should allow them to develop criteria when asked to do one as an assessed activity. Photographs and drawings could be used to capture what they have done for future reference.

Learners should be taught about the principles involved when reporting and recording accidents and near misses. The importance of reporting accidents to near misses should be emphasised. It is possible that research from learning outcome 1 might contain useful information regarding the requirements of RIDDOR. Visits to companies to see their procedures will strengthen learners' understanding of this and all other health, safety and welfare aspects.

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 demonstrates one way in planning the delivery and assessment of this unit.

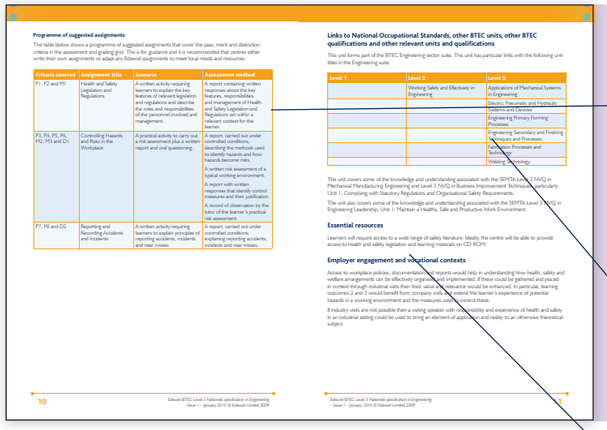
Topic and suggested assignments/activities and assessment
Whole-class teaching: • introduction to unit, scheme of work and methods of assessment • introduction to the key features of health and safety legislation and regulations • examine examples of the application and use of health and safety legislation and regulations in industry. *Individual/small group work:* • work using case studies to explore relevant health and safety legislation and regulations within a range of industrial settings.
Whole-class teaching: • describe roles and responsibilities of those involved in health and safety. Group work: • case studies of roles and responsibilities. *Individual learner research:* • investigate roles and responsibilities of HSE and their reports.
Preparation for and carrying out **Assignment 1: Health and Safety Legislation and Regulations** (P1, P2 and M1).
Whole-class teaching: • introduction to hazards and hazard control in the workplace • describe methods used to identify hazards in a working environment and how to work with and use accident data. *Industrial visit(s):* • take a working environment to consider potential for harm. Group work: • use of case studies to look at working environments and identify the potential for harm in a number of relevant situations.
Whole-class teaching: • describe hazards that become risks and the level of risk • describe hazards relating to electrical and mechanical safety and their respective control measures. Group work: • classify trivial or significant risk and identify the potential for harm. *Individual learner exercises:* • to identify and describe potential electrical and mechanical hazards and the most appropriate control measures.

Programme of suggested assignments

For guidance only, this table lists ideas for assignments that would cover the grading criteria. It is recommended that you write your own assignments or adapt Edexcel's to meet local needs and resources. Remember: all assignments must be internally verified by your centre before issue to learners to ensure they are fit for purpose.

Links to National Occupational Standards, other BTEC units and BTEC qualifications

Shows opportunities for integrated delivery of units.



Programme of suggested assignments

The table below shows a programme of suggested assignments that cover the pass, merit and distinction criteria in the assessment and 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
P1, P2 and M1	Health and Safety Legislation and Regulations	A written activity requiring learners to explain the key features of relevant legislation and regulations and describe the roles and responsibilities of the personnel involved and management.	A report containing written responses about the key features, responsibilities and management of Health and Safety Legislation and Regulations set within a relevant context for the learner.
P3, P4, P5, P6, P7, P8, M2, M3 and D1	Controlling Hazards and Risks in the Workplace	A practical activity to carry out a risk assessment plus a written report and oral questioning.	A report, carried out under controlled conditions, describing the methods used to identify hazards and how hazards become risks. A written risk assessment of a typical working environment. A report with written responses that identify control measures and their justification. A record of observation by the tutor of the learner's practical risk assessment.
P7, P8 and D2	Reporting and Recording Accidents and Incidents	A written activity requiring learners to explain principles of reporting accidents, incidents and near misses.	A report, carried out under controlled conditions, explaining reporting accidents, incidents and near misses.

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 the following unit titles in the Engineering suite:

Level 1:	Level 2:	Level 3:
	Working Safely and Effectively in Engineering	Applications of Mechanical Systems in Engineering
		Electric, Pneumatic and Hydraulic Systems and Devices
		Engineering Primary Forming Processes
		Engineering Secondary and Finishing Techniques and Processes
		Fabrication Processes and Techniques
		Welding Technology

The unit covers some of the knowledge and understanding associated with the SEMTA Level 3 NVQ in Mechanical Manufacturing Engineering and Level 3 NVQ in Business Improvement Techniques, particularly Unit 1: Complying with Statutory Regulations and Organisational Safety Requirements.

The unit also covers some of the knowledge and understanding associated with the SEMTA Level 3 NVQ in Engineering Leadership, Unit 1: Maintain a Healthy, Safe and Productive Work Environment.

Essential resources

Learners will require access to a wide range of safety literature. Ideally, the centre will be able to provide access to health and safety legislation and learning materials on CD ROM.

Employer engagement and vocational contexts

Access to workplace policies, documentation and reports would help in understanding how health, safety and welfare arrangements can be effectively organised and implemented. If these could be gathered and placed in context through industrial visits then their value and relevance would be enhanced. In particular, learning outcomes 2 and 3 would benefit from company visits that extend the learner's experience of potential hazards in a working environment and the measures used to control these.

If industry visits are not possible then a visiting speaker with accessibility and experience of health and safety in an industrial setting could be used to bring an element of application and reality to an otherwise theoretical subject.

Essential resources

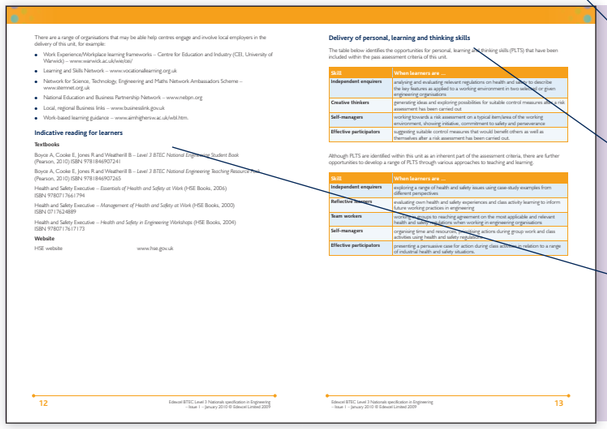
Specialist resources needed to allow learners to generate evidence for the unit.

PLTS signposting

Opportunities to develop personal, learning and thinking skills within the unit.

Indicative reading, resources packs and websites

Suggested learner resource material.



There are a range of organisations that may be able help centres engage and involve local employers in the delivery of this unit, for example:

- Work Experience/Workplace learning frameworks – Centre for Education and Industry (CEI), University of Warwick) – www.warwick.ac.uk/wie/cei/
- Learning and Skills Network – www.vocationallearning.org.uk
- Network for Science, Technology, Engineering and Maths Network Ambassadors Scheme – www.stemnet.org.uk
- National Education and Business Partnership Network – www.nebpn.org
- Local, regional Business links – www.businesslink.gov.uk
- Work-based learning guidance – www.aimhigherwac.ac.uk/wbl.htm.

Indicative reading for learners

Textbooks

Boyce A, Cooke E, Jones R and Weatherill B – *Level 3 BTEC National Engineering* Student Book (Pearson, 2010) ISBN: 9781846907241

Boyce A, Cooke E, Jones R and Weatherill B – *Level 3 BTEC National Engineering* Teaching Resources (Pearson, 2010) ISBN: 9781846907265

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

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

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

Website

HSE website www.hse.gov.uk

Delivery of personal, learning and thinking skills

The table below identifies the opportunities for personal, learning and thinking skills (PLTS) that have been included within the pass assessment criteria of this unit.

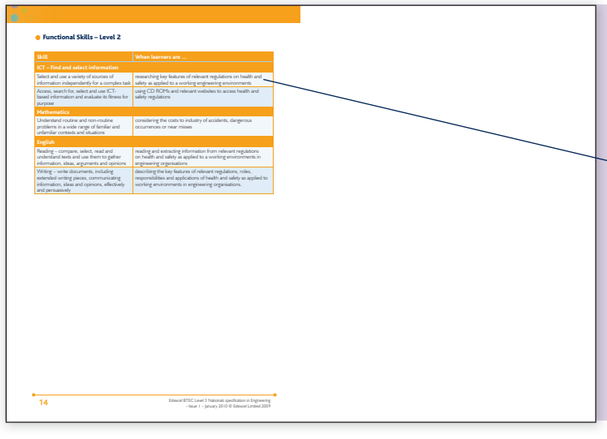
Skill	When learners are …
Independent enquirers	analysing and evaluating relevant regulations on health and safety to describe the key features as applied to a working environment in two selected or given engineering organisations
Creative thinkers	generating ideas and exploring possibilities for suitable control measures after a risk assessment has been carried out
Self-managers	working towards a risk assessment on a typical item/area of the working environment, showing initiative, commitment to safety and perseverance
Effective participators	suggesting suitable control measures that would benefit others as well as themselves after a risk assessment has been carried out.

Although PLTS are identified within this unit as an inherent part of the assessment criteria, there are further opportunities to develop a range of PLTS through various approaches to teaching and learning.

Skill	When learners are …
Independent enquirers	exploring a range of health and safety issues using case-study examples from different perspectives
Reflective learners	evaluating own health and safety experiences and class activity learning to inform future working practices in engineering
Team workers	working as a group to reaching agreement on the most applicable and relevant health and safety regulations when working in engineering organisations
Self-managers	organising time and resources and prioritising actions during group work and class activities using health and safety regulations
Effective participators	presenting a persuasive case for action during class discussion in relation to a range of industrial health and safety situations.

Functional skills signposting

Opportunities to generate evidence to meet the requirements of functional skills tests.



Functional Skills – Level 2

Skill	When learners are …
ICT – Find and select information	
Select and use a variety of sources of information independently for a complex task	researching key features of relevant regulations on health and safety as applied to a working engineering environments
Access, search for, select and use ICT-based information and evaluate its fitness for purpose	using CD ROMs and relevant websites to access health and safety regulations
Mathematics	
Understand routine and non-routine problems in a wide range of familiar and unfamiliar contexts and situations	considering the costs to industry of accidents, dangerous occurrences or near misses
English	
Reading – compare, select, read and understand texts and use them to gather information, ideas, arguments and opinions	reading and extracting information from relevant regulations on health and safety as applied to a working environments in engineering organisations
Writing – write documents, including extended writing pieces, communicating information, ideas and opinions, effectively and persuasively	describing the key features of relevant regulations, roles, responsibilities and applications of health and safety as applied to working environments in engineering organisations.

*Guided learning hours (GLH): all the times when a member of staff (e.g. tutor, trainer or facilitator) is present to give guidance.

Developing a scheme of work

All BTEC Level 3 National units are structured in a way that should facilitate your delivery of the course. Each unit includes an **outline learning plan**. This is provided as an **example only** to illustrate just one way you might deliver that unit. This plan includes suggested assignments that will cover the unit's grading criteria.

From this outline learning plan you might develop a more detailed scheme of work. To show how this might be done, the outline learning plan on page 24 is taken from Unit 1: Health and Safety in the Engineering Workplace for the BTEC Level 3 Nationals in Engineering. On page 26 there is an example of a scheme of work to show you how one can be developed from the other.

Design your own scheme of work to factor in the needs of your learners and local resources, and to reflect the assignments that you have designed for the unit. (Always ensure that assignments – whether designed by yourself, Edexcel or by others – are internally verified **in your centre** before use; see page 40.)

Delivery notes

The **introductory session** could be delivered using practical activities. For example, when explaining what constitutes appropriate evidence for an assignment, learners could work in groups to identify the various methods for themselves. (For more information on assignment evidence, see page 36.)

Always try to make your teaching as learner-centred as possible and **allow learners to experiment and test out ideas that they may have**. An example of this would be to use quality assurance data sourced from local industry when doing statistical analysis in the mathematics unit. Another example would be to carry out testing and analysis of materials samples taken from products manufactured by local industry. In order to engage all learners, the programme has to be interesting and the learning has to be fun. Using a variety of teaching strategies is a must. Always allow the learners to provide you with feedback on how individual sessions went.

Visiting speakers are particularly useful because they are able to bring the topics covered alive. Your programme team should endeavour to forge links with local businesses not only for the valuable input they provide via guest speakers, but also as a possible source of work experience opportunities. They can also make a significant contribution to all aspects of the programme by attending course team meetings.

Group work

Group work is vitally important on BTEC programmes and you should provide frequent opportunities for it throughout the course. Remember, however, that if any group work contributes towards an assignment, individual learners must clearly state and provide evidence of their own contribution to the work to meet each grading criterion.

Looking out for plagiarism

Be careful with the use of the Internet, as unfortunately the copying and pasting of text into assignments is happening with alarming regularity. A plagiarism policy even at this level may be needed to ensure that learners as far as possible are referencing the works of others. Please see www.jcq.org for an example of a plagiarism policy that you could adopt for your school or college.

How do I cover the content?

- Work closely with the specification document to ensure that you fully understand the coverage for each learning outcome within each unit.
- Check your content coverage against the grading criteria.
- Make sure that you understand the distinction between content that must be covered and content that is optional, such as topics listed after the words "eg" in the specification – here tutors may use these examples or replace them with relevant alternatives of their own choice.
- Rather than following the assignment ideas in the specification, it may be possible for you to consider smaller assignments over shorter periods of time which will keep your learners engaged. Remember that your assignments must always be designed for **your** learners.
- Use a matrix tracker to plan your assignments and cross check to see if all content is covered. See page 19 for examples of tracker sheets.

When learners are working towards assignments, advise them to **remain focused on providing evidence that is relevant** and fulfils the criteria. Many learners will include unnecessary information when writing assignments.

Achieving the correct balance between formal teaching, self-directed study, practical activities and industrial visits is very important and will depend on the unit being taught. Guidance is given in the unit specifications. Adopting a kinaesthetic learning approach will benefit many of the learners.

Learners should understand how continuous assessment works in terms of interim and formative assessment. All learners should submit interim work or show you where they are with their assignments so that you can feed back on how well they are meeting the tasks against the criteria that they are working towards. If a learner has already met the pass criteria, you should indicate how the learner can achieve merit and distinction grades. If the pass criteria are not yet met, indicate what the learner has to do to get to the appropriate standard.

Outline learning plan for Unit 1: Health and Safety in the Engineering Workplace

Topic and suggested assignments, activities and assessment
Whole-class teaching: • introduction to unit, scheme of work and methods of assessment • introduction to the key features of health and safety legislation and regulations • examine examples of the application and use of health and safety legislation and regulations in industry **Individual/small group work:** • work using case studies to explore relevant health and safety legislation and regulations within a range of industrial settings
Whole-class teaching: • describe roles and responsibilities of those involved in health and safety **Group work:** • case studies of roles and responsibilities **Individual research:** • investigate roles and responsibilities of HSE and their reports
Preparation for and carrying out Assignment 1 Health and Safety Legislation and Regulations (P1, P2 and M1)
Whole-class teaching: • introduction to hazards and hazard control in the workplace • methods used to identify hazards in a working environment and how to work with and use accident data **Industrial visit(s):** • view a working environment to consider potential for harm **Group work:** • use a selection of case studies to look at working environments and identify the potential for harm in a number of relevant situations
Whole-class teaching: • describe hazards that become risks and the level of risk • describe hazards relating to electrical and mechanical safety and their respective control measures **Group work:** • classify trivial or significant risk and identify the potential for harm **Individual exercises:** • identify and describe potential electrical and mechanical hazards and the most appropriate control measure
Whole-class teaching: • explain safety devices and their applications **Industrial visit(s):** • view a working environment to examine safety devices in-situ **Individual learner exercises:** • identify and describe safety devices and their applications

Topic and suggested assignments, activities and assessment
Whole-class teaching: • introduction to risk assessment • describe five step process **Group work:** • use risk assessment case studies covering a range of control measures • carry out a number of risk assessments to evaluate risk and adequacy of control measures **Individual activity:** • examine an engineering task, carry out a risk assessment and prepare a short training course for personnel
Preparation for and carrying out Assignment 2: Controlling Hazards and Risks in the Workplace (P3, P4, P5, P6, M2, M3 and D1)
Whole-class teaching: • introduction to the reporting and recording of accidents and incidents • discuss why employers keep records of serious accidents, incidents and emergencies **Group work:** • look at accident and incident case study reports, the methods of classification and trends
Whole-class teaching: • describe responsibilities of competent persons and the cost of accidents in terms of direct, indirect and human consequences **Group work:** • analyse accident trends in the engineering industry and calculate the cost of an accident in the workplace from given data
Whole-class teaching: • describe regulations on accident recording and reporting and how to deal with near misses or dangerous occurrences **Individual learner research:** • investigate regulations for reporting in relevant areas of industry.
Preparation for and carrying out Assignment 3: Reporting and Recording Accidents and Incidents (P7, P8 and D2)
Feedback on assessment, unit evaluation and close

Sample scheme of work for Unit 1: Health and Safety in the Engineering Workplace

Session	Teaching topic	Approx time allocated*	Linked assessment	Resource checklist		Core content and delivery methods
1	Introduction to BTEC National in Engineering and the programme Health and safety legislation and regulations	180 mins	P1	http://www.safetycare.co.uk for a range of videos Handouts – selected list of legislation relating to engineering. This needs to be very focused		Tutor presentation Overview of evidence requirements Safetycare (UK) Ltd video no. 996 Safety Awareness with video questionnaire Tutor presentation Group activity on health and safety legislation
2	Researching health and safety legislation and regulations	180 mins	P1	Handouts- selected list of legislation relating to engineering. This needs to be very focussed 'Snapshots' of engineering situations that need to be regulated		Small group activity to research H&S legislation and regulations Tutor receives feedback from groups
3	Applications of health and safety legislation and regulations, using case studies	180 mins	P1, M1	Matching cards – three sets: • legislation/regulation title • date of enactment • example of a situation where it applies Cards can be in 'hard' format or 'e' based using the white board		Tutor-led group activity: matching card game Group discussion about the card activity Individual and group work using case studies Overview and research the HSE website
4	Roles and responsibilities of people involved with health and safety in the workplace	180 mins	P2	Case study exemplars based on local engineering companies Handout which profiles guest speaker		Tutor presentation Group exercise – case studies featuring roles and responsibilities Tutor presents profile of guest speaker – preparation for the presentation in week 5
5	Roles and responsibilities of people involved with health and safety in the workplace	180 mins	P2, M1	Pro-forma for recording the results of the quiz		Presentation by a health and safety officer/manager from a local engineering company Question and answer follow up Tutor-led quiz based on H&S roles within industry
6	Assignment 1: Health and Safety Legislation and Regulations	180 mins	P1, P2, M1	HES reference documents – hard copy and 'e' based		Learners to work on their own with tutor advising and guiding
7	Assignment 1: Health and Safety Legislation and Regulations	180 mins	P1, P2, M1	HES reference documents- hard copy and 'e' based Multimedia facility that learners can use to overview their findings with the rest of the group		Learners to work on their own with tutor advising and guiding Overview what they found to rest of group

*The timings in this scheme of work reflect the time the learner is engaged in learning for the unit, both with the tutor (Guided Learning Hours, GLH) and in their own private study time.

Guided learning hours (GLH): all the times when a member of staff (e.g. tutor, trainer or facilitator) is present to give guidance ('contact time'). This includes lessons, lectures, tutorials and supervised study in, for example, learning resource centres and workshops. It also includes time spent with learners observing and assessing their work towards assignments.

Session	Teaching topic	Approx time allocated*	Linked assessment	Resource checklist		Core content and delivery methods
8	Hazards in the workplace	180 mins	P3	Matching cards – three sets: • engineering activity • potential for harm • consequence Case study exemplars based on local industry Company profile – as preparation for the visit in week 9		Tutor presentation Tutor-led group activity: matching card game Group discussion about the card activity Individual and group work using case studies Safetycare (UK) Ltd video no.1000 Understanding Hazards & Risk with video questionnaire
9	Hazards and hazard control in the workplace	180 mins	P3	An area in a local engineering company where practical activities are carried out e.g.: • machine shop • assembly area • test area • maintenance department Handout – H&S procedures when on site		Industrial visit to view a working environment and consider potential for harm
10	Hazards in the workplace	180 mins	P4	Multimedia facility which can be used by the learners Possible use of video camera to record presentation for PLTS purposes		Small group discussion about industrial visit and preparation of feedback in the form of PowerPoint presentations Tutor receives feedback from groups
11	Controlling hazards which become risks	180 mins	P4	Handouts relating to hazardous scenarios COSHH data sheets Matching cards – three sets: • picture/cartoon of a hazardous situation • name of the hazard • an appropriate risk reduction technique		Tutor presentation Group activity – identification of potential hazards and risk reduction techniques Matching card game
12	Safety devices and their applications	180 mins	P3, P4	An area in a local engineering company where practical activities are carried out e.g.: • machine shop • assembly area • test area • maintenance department Digital camera Handout – H&S procedures when on site		Industrial visit to view a working environment and examine safety devices in situ

*The timings in this scheme of work reflect the time the learner is engaged in learning for the unit, both with the tutor (Guided Learning Hours, GLH) and in their own private study time.

Guided learning hours (GLH): all the times when a member of staff (e.g. tutor, trainer or facilitator) is present to give guidance ('contact time'). This includes lessons, lectures, tutorials and supervised study in, for example, learning resource centres and workshops. It also includes time spent with learners observing and assessing their work towards assignments.

Session	Teaching topic	Approx time allocated*	Linked assessment	Resource checklist		Core content and delivery methods
13	Safety devices and their applications	180 mins	P3, P4	Exemplars of safety devices- images and hardware which can be passed around the group.		Paired activity – produce a short PowerPoint presentation about safety devices seen during the visit. Include digital images Presentation to other groups and tutor Discussion and feedback
14	Risk assessment principles – the five steps	180 mins	P5	Access to a college workshop Access to HSE website Handout which profiles guest speaker (wk 15)		Tutor-led review of HSE document: http://www.hse.gov.uk/pubns/indg163.pdf Practical exercises: learners carry out college workshop investigation, discussing and recording significant risks Tutor presents profile of guest speaker as preparation for the presentation in week 15
15	Risk assessment case studies	180 mins	P5, M2	Presentation facility		Presentation by a health and safety officer/manager from a local engineering company Question and answer follow up Tutor-led quiz based on risk assessing industrial activities
16	Risk assessment	180 mins	P6, M3, D1	Risk assessment reporting documentation (pro-forma)		Paired activity: risk assessing a given engineering activity. This carries over to week 17
17	Risk assessment	180 mins	P6, M3, D1	Risk assessment reporting documentation (pro-forma) Exemplars of documentation used by a local engineering business		Paired activity: preparing a training course for personnel carrying out the activity identified in week 16 Present training course to tutor and other groups
18	Assignment 2: Controlling Hazards and Risks in the Workplace	180 mins	P3, P4, P5, P6, M2, M3, D1	Access to a workshop environment – e.g. the learner's place of work or a centre workshop Pro-forma observation records and witness statements for the tutor to complete		Learners to work on their own with tutor advising and guiding Written evidence supported by oral questioning from the tutor
19	Assignment 2: Controlling Hazards and Risks in the Workplace	180 mins	P3, P4, P5, P6, M2, M3, D1	Access to a workshop environment – e.g. the learner's place of work or a centre workshop Pro-forma observation records and witness statements for the tutor to complete Handout – profile of company person being met in week 20		Learners to work on their own with tutor advising and guiding Written evidence supported by oral questioning from the tutor Tutor gives out profile of company person being met in week 20
20	Reporting and recording accidents and incidents	180 mins	P7	Handout – H&S procedures when on site Handout – pro-forma for making a written record of discussions		Industrial visit for a discussion with someone who is responsible for managing accidents and incidents

*The timings in this scheme of work reflect the time the learner is engaged in learning for the unit, both with the tutor (Guided Learning Hours, GLH) and in their own private study time.

Guided learning hours (GLH): all the times when a member of staff (e.g. tutor, trainer or facilitator) is present to give guidance ('contact time'). This includes lessons, lectures, tutorials and supervised study in, for example, learning resource centres and workshops. It also includes time spent with learners observing and assessing their work towards assignments.

Session	Teaching topic	Approx time allocated*	Linked assessment	Resource checklist		Core content and delivery methods
21	Reporting and recording accidents and incidents – keeping records	180 mins	P7	Tutor-produced questionnaire which complements the video		Safetycare (UK) Ltd video no. 958 Accident Investigation Group Discussion with video questionnaire
22	Accident/incident classification and trends	180 mins	P7, D2	Handouts – accident and incident case studies and reports		Group activity to review case study incident reports Tutor-led whole-group discussion
23	Responsibilities of competent persons	180 mins	P7	Exemplars of company policies on near miss and no-blame reporting		Group activity: examine existing company policies on near miss or no-blame reporting
24	The cost of accidents – direct, indirect and human consequences	180 mins	P8	Handouts sourced from HSE (Health and Safety Executive) Learner access to the HSE website		Learners to complete statutory (RIDDOR) reporting document
25	Accident trends in the engineering industry	180 mins	P8	Handouts – data about accident trends and the costs involved – cost to employer and employee Lost production Some data can be sourced from Trade Union and newspaper reports		Group activity exercises used to analyse data from current and past records and then discuss trends prior to discussion on current trends
26	Accident reporting Dealing with near misses and dangerous occurrences	180 mins	P8, D2	Handouts – exemplars of documentation used to record accidents in the workplace Gapped handout which learners complete		Tutor presentation followed by class discussion Completion of gapped handout
27	Regulations for reporting accidents and incidents in industry	180 mins	P7, P8, D2	Handouts sourced from HSE (Health and Safety Executive) Learner access to the HSE website		Individual research and presentation of findings as a short report Tutor-led discussion of group reports
28	Assignment 3: Reporting and Recording Accidents and Incidents	180 mins	P7, P8, D2	Controlled conditions for undertaking the assignment		Small group role-play as a lead in to the assignment Learners work on their own producing a report with tutor advising and guiding
29	Assignment 3: Reporting and Recording Accidents and Incidents	180 mins	P7, P8, D2	Controlled conditions for undertaking the assignment		Learners to work on their own producing a report with tutor advising and guiding
30	Course review	180 mins		End of unit questionnaire		Focus groups Issuing and completion of end of course questionnaire
	Total	**90 hours**				

*The timings in this scheme of work reflect the time the learner is engaged in learning for the unit, both with the tutor (Guided Learning Hours, GLH) and in their own private study time.

Guided learning hours (GLH): all the times when a member of staff (e.g. tutor, trainer or facilitator) is present to give guidance ('contact time'). This includes lessons, lectures, tutorials and supervised study in, for example, learning resource centres and workshops. It also includes time spent with learners observing and assessing their work towards assignments.

Assessment and grading

Learners work through BTEC units by participating in the learning programme and tackling the assignments you set for them. The ultimate aims in the setting of assignments are to cover the grading criteria for each unit and to set learning within a vocational context. (Full guidance on assignment design can be found on page 36.)

Tell me more about assignments

The number of assignments for each unit will vary. It is up to you how you decide to cover the grading criteria for each unit. Take into account the ability of your cohort of learners, the requirements of the unit itself, local resources and not least your imagination as tutor.

There are drawbacks in setting both too few and too many assignments. If you set too few assignments (by, say, adopting the one-off project approach), you can place too much reliance on large pieces of evidence that may only be available late in the programme. These large assignments can be hard to assess and difficult to put right if things go wrong.

Too many assignments can put a burden on both you and the learners. This can lead to fragmentation of the unit. The unit content, outcomes and grading criteria have generally been produced to provide a coherent package. As such, the assignments should, wherever possible, maintain the coherence and links between the outcomes and grading criteria of the unit.

When designing an assignment it is important to set it in a proper engineering context so that learners can see why it is relevant. The assignment should be more than a hurdle to be jumped over.

Your assignment delivery can be through differently paced assignments – some designed for learners to complete in a short space of time, and others over the course of a half or a whole term. If some learners are getting bored with a long assignment, then select one of the P criteria and turn it into a mini-assignment which can be covered quickly to get learners interested and, we hope, increase their motivation for continuing with the larger assignment.

It is good practice to provide learners with a list of assignment deadlines over the period of study. This will help learners to manage their workload. The table below shows part of an example assignment plan (the table could be extended to cover two years).

Example of an assignment scenario

A good example of a vocational scenario for a BTEC National Engineering assignment follows: 'Engineers are very good at designing products but success in the marketplace can only be achieved if these products are fit for purpose and conform to standards. Before a new domestic airliner or motor vehicle can be sold they have to be tested and their designs proven against a set of internationally agreed criteria.

This link gives information about the Civil Aviation Authority (CAA) Certificate of Airworthiness: http://www.caa.co.uk/

To achieve certification for a new plane the manufacturer has two options:

- Wait until the plane is totally finished and then "go for broke" hoping that it passes scrutiny
- Involve the CAA at the design stage and take counsel from them

In this assignment you will investigate how companies get it right first time.'

Kick-starting an assignment

The most successful assignments are those that allow learners to achieve the desired learning outcomes by visiting a local engineering site. Even better is where the learner can use their work experience or part-time employment to generate evidence for their assignments, though it may prove difficult to obtain part-time, engineering-related employment. Your teaching programme should lead learners into each assignment.

Engage your learners

If your learners are disengaged and reluctant, initial assignments could relate to applications of engineering and technology that they may be interested in, such as mobile phones, hi-tech sports equipment, video gaming, musical instruments and fitness training.

	September	October	November	December	January
Unit 1	Assignment 1	Assignment 2			Assignment 7
Unit 2			Assignment 4		
Unit 3		Assignment 3		Assignment 6	
Unit 4			Assignment 5		

Generating assignment evidence from work placements

The most successful assignments are those where the learner is using their work experience or full/part-time employment to generate evidence for their assignments.

For example, in Unit 1 (Health and Safety in the Engineering Workplace) learners have to investigate the control measures used to prevent accidents in workshop. They could start by talking to the safety manager and workshop staff of a local company. Having gathered suitable data they then produce a control measures policy for the company and talk it through with the workshop manager.

Building a portfolio of evidence

Encourage your learners to compile a portfolio of evidence to meet the grading criteria for each unit. It is important that learners have the opportunity early on in the course to develop portfolio building skills, so that learners can manage and organise their evidence. It is well worth spending time on this during the course induction period.

What about grading?

Learners need to provide evidence to meet the grading criteria shown in the unit specification.

- To **pass** a unit, every pass criterion needs to be achieved.
- To gain a **merit**, all the pass and merit criteria need to be achieved.
- To gain a **distinction**, all the pass, merit and distinction criteria need to be achieved.

See the specification for further information on how unit grades are converted to points to calculate a learner's overall grade for the course. Learners who complete the unit but who do not meet all the pass criteria are graded 'unclassified'.

Each assignment must cover part or all of the grading criteria in the unit's assessment and grading grid. This will be dependent on the nature and size of the individual assignment, and how it relates to the content of the unit (or units, if you are integrating unit delivery through assignments).

Each criterion generally begins with an operative verb, for example:

Pass = describe (what)
Merit = explain (how)
Distinction = justify/evaluate (why)

It is crucial that these same operative verbs are used in the wording of assignment tasks to yield correct evidence from the learner to meet each criterion.

The grading grid for Unit 1 (Health and Safety in the Engineering Workplace) has a total of 13 pass, merit and distinction grading criteria. The **programme of suggested assignments** in the unit specification suggests that these could be organised into the following clusters/individual assignments:

- Assignment 1: P1, P2 and M1
- Assignment 2: P3, P4, P5, P6, M2, M3 and D1
- Assignment 3: P7, P8 and D2

If this unit is delivered first, then it may be advisable to break assignments 1 and 2 down into smaller tasks consisting of just P criteria. It is your decision whether to include the merit and distinction criteria in these early stages, or to introduce them into later assignments once you are happy that the building blocks of the understanding and application have been achieved.

If some learners are getting bored with the long second assignment, then select either the P3 or P4 grading criterion and turn it into a mini-assignment that can be covered quickly to get them interested. This should increase their motivation for continuing with the longer assignment.

When the criteria include the assessment of skills or knowledge and understanding that cannot always be evidenced in writing, the use of observation sheets or witness statements is advised – preferably with the unit criteria printed out so that accurate judgements can be made against these criteria. All documents of this nature should be signed and dated to form an authentic audit trail within the learner's assessment profile. For more information about the use of observation and witness statements see page 37.

For full information on grading, please see the specification.

Assignment design

Assignments must be designed to motivate learners, to allow learners to achieve specified unit grading criteria in vocational contexts, and must call on learners to produce varied forms of evidence.

When designing assignments it is possible to:
- have one assignment brief to assess all the grading criteria of a unit
- have two or more smaller assignment briefs for a unit
- allow assessment of criteria from one unit to be integrated with assessment of criteria from another unit.

The assignment brief must include:

- the title and level of the qualification
- the title and number of unit(s) under assessment
- the title of the assignment
- the date the assignment is set (start date)
- submission/assessment date(s)
- the name of the assessor(s)
- the name of the learner
- space for the learner to sign to confirm the work is their own.

In addition to this the use of interim/milestone assessment dates is recommended – especially where assignments cover a number of criteria. It is essential that assignments have a suitable timescale.

The scenario

The assignment should be based within an **interesting vocational scenario** so that learning can be applied to the real world of work.

The tasks

Each assignment is divided into tasks: detailed descriptions of the activities learners will undertake in order to produce evidence to meet the unit's grading criteria and complete the assignment. Each task must:
- specify the extent and nature of evidence that learners should present
- be clear, specific, time-bound, stepped, relevant and realistic
- address the grading criteria they target, paying careful attention to the operative verb of each criterion ('describe', 'explain', 'evaluate', etc.)
- reference the grading criteria they address
- be presented in learner friendly, engaging and inspirational language; they should not simply repeat the grading criteria
- address the grading criteria in full, and not split a criterion across more than one assignment.

Evidence

Clearly state what learners are expected to provide as evidence for each task. Forms of evidence can include:
- recorded discussions
- log books/diaries
- artefacts
- presentations
- performance
- brochures/leaflets/posters
- case studies
- web-based material (websites, blogs, VLE, podcasts, etc.)
- role plays
- reports/written investigations
- annotated photographs
- promotional material
- work-based evidence.

For evidence that is not written, observation records or witness statements can be completed. See opposite (page 37).

Assessment and grading criteria

- The assignment must state exactly which assessment criteria are being addressed.
- Centres **must not** rewrite any aspect of the unit's assessment and grading criteria nor add their own centre-devised criteria.
- Centres may provide additional guidance, explaining assessment criteria requirements in learner friendly language, but the exact wording of the published criteria must appear on the assignment.

Local needs

Assignment briefs should always be developed and adapted to meet the needs of learners at your centre and to take account of your centre's resources. They must also be checked by someone in your centre (internally verified) to ensure they are fit for purpose **before** they are given to learners (for more information on this see page 40).

The assignment brief will often need to be supplemented with further information, for example:
- a demonstration
- handouts
- videos or DVDs
- references to books
- references to websites
- visits to source primary research materials within the locality of your centre
- visits to local businesses
- visits from guest speakers from local engineering companies.

An example of an assignment brief can be found on page 48.

Learner responsibility

Learners need to take responsibility for completing their assignments. Many centres have instigated learner agreements or contracts, which learners sign to commit themselves to meeting all deadlines and the other demands of completing their programme. Learners need to produce assessment evidence that is all their own work – plagiarism can be an issue. It is important that learners are instructed on the correct use of referencing. For more information, see Edexcel's *Centre Guide to Managing Quality: Policies, Procedures and Practice.*

Integrating unit assessment

An assignment can have one unit as the main focus, but learners may also be producing evidence towards other units as well.

Observation records

An observation record is used to provide a formal record of an assessor's judgement of learner performance (for example, during presentations, practical activity, performance, role play) against the targeted grading criteria. The record:
- will relate directly to the grading criteria in the unit specification
- may confirm achievement or provide specific feedback of performance
- will provide primary evidence of performance
- will be sufficiently detailed to enable others to make a judgement as to quality and whether there is sufficient evidence of performance.

Observation records should be accompanied by supporting additional evidence. This may take the form of visual aids, video or audio tapes, CDs, photographs, handouts, preparation notes, cue cards, diary records, log books and/or peer assessment records. Observation records should also:
- note how effectively these were used to meet the assessment criteria
- record the assessor's comments
- be evidenced in a learner's portfolio when assessment is carried out through observation, together with relevant supporting evidence
- be completed by the assessor who must have direct knowledge of the specification to enable an assessment decision to be made
- be signed and dated by the assessor and the learner
- also include the learner's comments.

An observation record can have greater validity than a witness statement since it is capable of directly recording an assessment decision without reference to others.

Witness statements

A witness statement is used to provide a written record of learner performance (process evidence) against grading criteria. Someone other than the assessor of the qualification/unit may complete it. This may be an assessor of a different qualification or unit, a work placement supervisor, a technician, a learning resources manager or anyone else who has witnessed the performance of the learner against given assessment criteria. It can be someone who does not have direct knowledge of the qualification, unit or assessment criteria as a whole but who is able to make a professional judgement about the performance of the learner in the given situation.

The quality of a witness statement is greatly improved and enables the assessor to judge the standard and validity of performance against the assessment criteria if:
- the witness is provided with clear guidance on the desirable characteristics required for successful performance by including a checklist
- the grading criteria are present on the witness testimony (this may need further amplification for a non-assessor)
- the learner or witness also provides a statement of the context within which the evidence is set.

The witness statement does not confer an assessment decision. The assessor must:
- consider all the information in the witness statement
- note the relevant professional skills of the witness to make a judgement of performance
- review supporting evidence when making an assessment decision
- review the statement with the learner to enable a greater degree of confidence in the evidence
- be convinced that the evidence presented by the witness statement is valid, sufficient and authentic.

When a number of witnesses are providing testimonies:
- every witness testimony should be signed and dated by the witness
- information of their job role/relationship with the learner should also be available.

These details add to the validity and authenticity of the testimony and the statements made in it. Centres should note that witness testimonies can form a vital part of the evidence for a unit(s) but they should not form the main or majority assessment of the unit(s).

Example forms for observation records and witness statements are given on pages 38 and 39 and can be modified to show a centre's own logo. They are available in Word on the CD-ROM in your Specification Pack.

Observation record (by tutor)

Learner name	
Programme	
Unit number and title	

Description of activity undertaken (please be as specific as possible)

Assessment and grading criteria

How the activity meets the requirements of the assessment and grading criteria

Learner signature		**Date**	
Assessor signature		**Date**	
Assessor name			

Witness statement (by external observer)

Learner name	
Programme	
Unit number and title	

Description of activity undertaken (please be as specific as possible)

Assessment and grading criteria

How the activity meets the requirements of the assessment and grading criteria, including how and where the activity took place

Witness name		**Job role**	
Witness signature		**Date**	
Learner signature		**Date**	
Assessor name			
Assessor signature		**Date**	

Internal verification of assignment briefs

Internal verification is a quality assurance system you must use to monitor assessment practice and decisions. It is there to ensure that:

- assessment and grading are consistent across the programme
- assignments are fit for purpose
- assessment decisions accurately match learner work (evidence) to the unit grading criteria
- standardisation is a feature of centre assessment practice.

Every assignment must be internally verified **before they are issued** to learners. The internal verification should be done by a tutor who is vocationally competent and understands the BTEC Level 3 Nationals in Engineering units. This is to ensure that:

- the tasks and evidence will allow the learner to address the targeted criteria
- the assignment is designed using clear and accessible language
- learners' roles and tasks are vocationally relevant and appropriate to the level of the qualification
- equal opportunities are incorporated.

The system used to do this is a matter for individual centres. Edexcel fully supports the use of the centre's own quality assurance systems where they ensure robust internal standardisation.

Internal verification of assignment briefs should always be reported and recorded. If action is required, the assessor should complete this and return it to the internal verifier for sign off. Once the assignment is verified as fit for purpose, it may be issued to the learners.

Internal verifiers are advised to use the paperwork that is available both from the Edexcel website and on the CD-ROM in your Specification Pack (see the example on page 50) as this meets all Edexcel requirements.

Internal verification is to be seen as a supportive process. If an assignment brief is not fit for purpose, the internal verifier should return the assignment with appropriate comments. There should be a deadline set for the amendments to be made and, when all is approved, the documents should be signed and dated to give the team an auditable document. Tutors can engage in professional discussions where there is disagreement so that all standards and decisions are shared and understood.

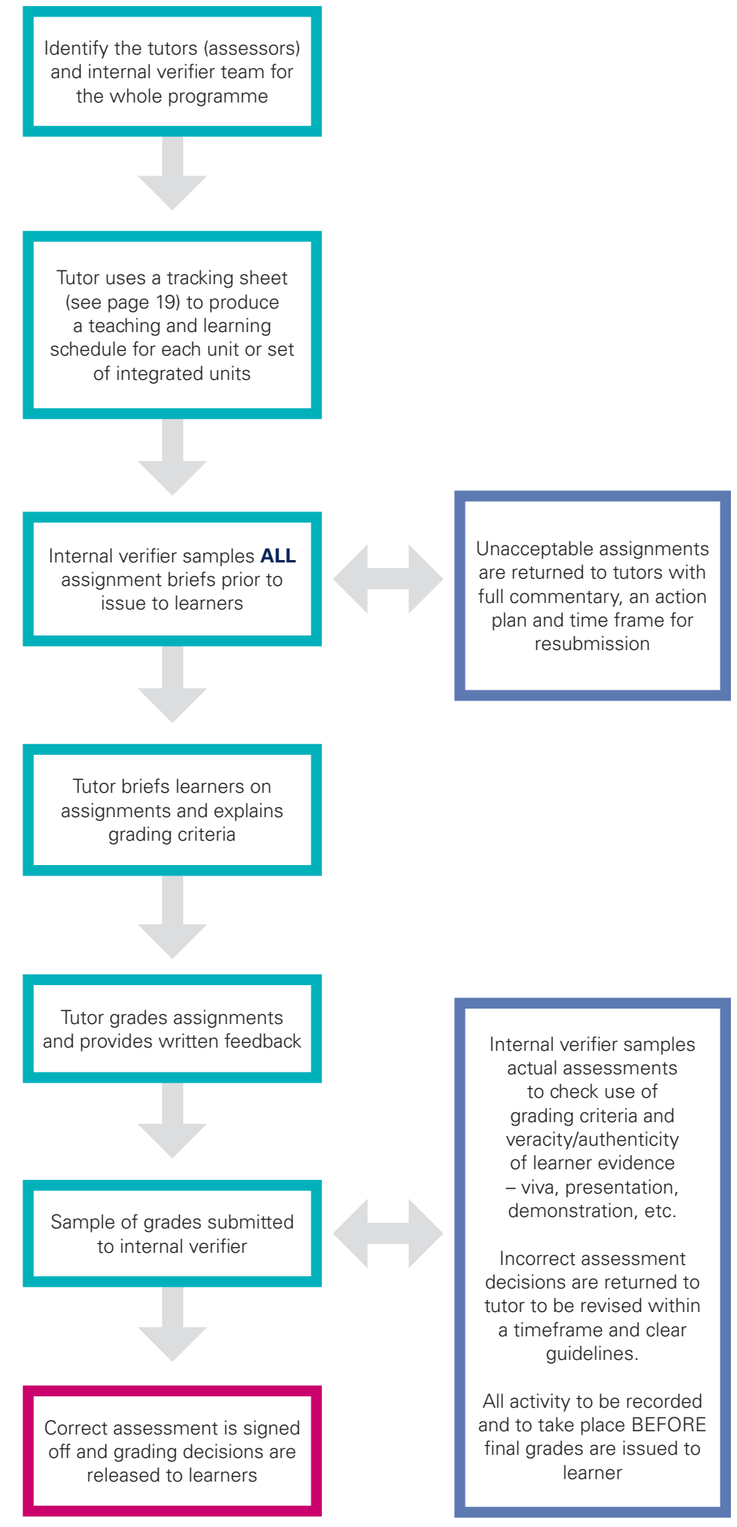
Lead internal verifiers

Each group of programmes has a lead internal verifier who coordinates the work of other internal verifiers and offers leadership on issues of internal standardisation and related training. The lead internal verifier will be expected to gain accreditation via the Edexcel online OSCA2 test. The achievement of this test will permit release and certification of learner attainment. For more information on becoming a lead internal verifier, see **www.btec.co.uk**.

(Some programmes may be subject to annual sampling prior to release and certification of learner attainment.)

For an example of an internal verification form for assignment brief, see page 50

Procedure for internal verification



Grading an assignment

When designing an assignment it is key that you set the level of expectation for learners and provide guidance related to the kinds of evidence that they should be producing. Assignments will not, ideally, require a uniform response otherwise you will have difficulty in assessing across the range of grading criteria – differentiated learning would be constrained. Learners should have the freedom to develop their own responses within the demands of the learning outcomes and grading criteria.

When grading an assignment it is good practice to use a form such as that shown on page 59 (this is available on the CD-ROM in your Specification Pack). Alternatively, you can devise your own assessment record sheets but these should always allow feedback to learners on their performance against the criteria. It is also good practice to have space for learners to comment on their own work. It is important to give learners positive feedback that tracks and records their learning journey and achievement but also identifies areas for improvement. This is very valuable for learners who have missed criteria and need further encouragement and direction to achieve these criteria.

Learners normally receive feedback after each assignment has been assessed and internally verified.

Maximising learner achievement

Unit grades need not be submitted to Edexcel until the centre wishes to claim certification. Learners should have every opportunity to obtain the best unit grades they are able to achieve.

Learners could be encouraged to tackle criteria that they have missed or are weaker in understanding and achieving via newly designed assignments. Mini assignments or a second opportunity to meet the criteria in a fresh way is good educational practice. Newly designed assignment briefs must be internally verified before issue to learners.

Key points

- **Always use the specification document** and cross reference learner evidence to the learning outcomes, unit content and the unit's assessment and grading grid to ensure that the criteria specified in the assignment are fully met. For merit and distinction grades, the decisions should not to be based on quantity of evidence presented but on its quality (in meeting the criteria).
- **The guidance section of each unit specification will assist you** in reaching a decision. Delivery teams will find that standardisation prior to major unit assessment will be very useful in setting the standard of individual assessors' decisions. Use of a sample of learner work across the grade boundaries, especially if there are 'cusp' decisions, is the best way to set the team standard. This activity builds confidence among the assessor team. A post-standardisation session can be very useful for further discussions on the quality and standard of the work that has been assessed and it provides an opportunity for internal verification to take place before grading decisions are confirmed to learners.
- **Good feedback can identify the way that learners can achieve a higher grade** and positive feedback will assist learners who may be diffident about gaining more than a pass grade, which is a common problem with learners who are only prepared to do the bare minimum to pass. Assessors can encourage learner self-esteem and confidence by setting clear expectations. The feedback section can also provide learners with an individual learning plan, giving clear targets for completion, dates and deadlines.

Improving grades

In general, BTEC units expect a gradual improvement in grades over the progress of the course as learners become more familiar with the degree of independence and self-responsibility that is required to meet the higher grading criteria.

For an example of a graded assignment, see page 59.

Internal verification of assessor's comments

Once assignments have been graded, the internal verifier should sample these to ensure that the assessor is:

- conducting assessment in a fair and equable way
- using the specification document
- using grading criteria
- checking the veracity and authenticity of learner evidence through vivas, presentations, demonstrations, etc.

Internal verifiers can give their feedback using a form like the one shown on page 60.

Centre teams can hold standardisation sessions to establish the veracity and accuracy of the team's assessment decisions.

Any incorrect assessment decisions will be returned to assessors to be revised within a timeframe. Where the internal verifier deems the assessment decisions to be invalid, there must be dialogue between assessor and internal verifier to discuss the issues raised. This dialogue should be documented on the internal verification form together with the action to be taken and the resulting grading outcome. There must be a clear audit trail of the closing of the 'quality loop'.

All activity should be recorded and take place before final grades are issued to learners.

For an example of an internal verification form for assessor's decisions, see page 60.

Frequently asked questions

How many assignments should there be?

As many as is necessary to assess the unit. Determine the most appropriate assessment strategy for the unit, taking into account the ability of your cohort of learners, the requirements of the unit, local resources and your imagination as tutor.

If you set too few assignments (by, say, adopting the one-off project approach), you can place too much reliance on large pieces of evidence that may only be available late in the programme. These large assignments can be hard to assess and difficult to put right if things go wrong.

Too many assignments puts a burden on both you and the learners. This can lead to fragmentation of the unit. The unit content, outcomes and grading criteria have generally been produced to provide a coherent package. As such, the assignments should, wherever possible, maintain the coherence and links between the outcomes and grading criteria of the unit.

When should assignments be set?

There are two issues here when considering timing. First, be aware of the possibility of assessment overload – when there is a bunching of assignment deadlines across a number of units at any point in the programme. To avoid overload, detailed planning needs to take place at programme level to spread the assessment load. Second, there is the issue of identifying the most appropriate place within the unit for the assignment. This will be determined by a combination of the nature of the unit and the way the outcomes link together plus the overall approach taken to teaching and learning.

As a third consideration, if you are aware of the timing of external quality checks, it is good to prepare for this early in the year by setting some assignments and assembling all learner work. This will take away any pressure on your delivery and assessment.

Pacing for your learners

Taking Unit 1 (Health and Safety in the Engineering Workplace) as an example, the outcomes and assessment criteria can be covered through either three large assignments as shown in the unit specification, or you can set a number of assignments dealing with smaller bite sized chunks which may be more appropriate if this is going to be the first unit taught.

There might be underlying factors such as lack of skills and confidence that constrain learners from acquiring the necessary independence and deeper understanding for a merit. The distinction criteria test the learner's ability to justify the use of specific procedures and calculation techniques used in industry.

A developmental delivery pattern will allow your learners to grow their confidence and understanding and to show that they can deliver to the higher grade criteria in a consistent and complex manner. Some learners with limited ability will achieve consistent pass level results but will also see a definite improvement in the quality of their work.

Can tests be used?

Any valid method of assessment can be used and this includes tests in the appropriate place. However, the assessment must be made against the grading criteria set within the unit and this equally applies to tests as any other method. The overriding issue is the need to prepare assessment instruments that are fit for purpose, challenging, vocationally relevant and provide a vocational focus that will interest and engage the learner.

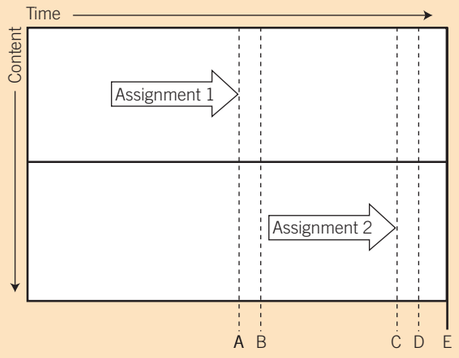
What if the work is handed in late?

Deadlines are an important aspect of any work. In general, time deadlines should be given for the end of the unit. Centres need to inform learners about their policy towards late work. If a learner hands in work late without prior negotiation, then the centre may decline to mark it. If the centre marks the work, then all grades applicable to the unit must be considered. In this case, the learner must not be punished for late work. As these programmes are vocational, some assignments will not permit late submissions, such as those that involve performance to an audience or the production of a newspaper.

How can learners be encouraged to achieve more than just a pass?

The assignment design, guidance and support are all important factors in getting learners to achieve at the highest possible level. It must be recognised that learners do have choice and if they make a conscious and informed choice to only achieve at pass level then there is probably very little anyone can do. However, experience shows that learners who become fully engaged in their BTEC programme – understanding its interim and varied assessment model, the importance of tutorials and clear recording of grading criteria they have achieved – will be encouraged and will aim higher.

Example of an assessment plan for two assignments



The first assignment covers the first outcome and has an initial deadline for feedback indicated at A. If this deadline is met, the work is reviewed and detailed feedback provided to learners at B. Learners can then rework the evidence, based on the feedback provided and resubmit for final assessment at E.

The deadline for feedback on assignment 2 is C, with feedback at D and final submission for assessment also at E. To encourage learners to meet the deadlines, work submitted after point B will only be assessed and then returned with feedback at D. Learners' work is only ever double handled using this process but it does provide learners with an opportunity to reflect on their work and achieve at the highest possible level.

Concerns about the advantages in this system for those learners who 'take more time' to achieve are balanced out by the advantages gained by the informed feedback and, possibly, the removal of work burden for those who meet deadlines. What this system does achieve is that it encourages learning based on sound assessment decisions.

What if a learner doesn't achieve a pass?

Feedback and support should be provided to ensure that the learner is aware of any failings in the work presented for assessment and then given the opportunity to rectify these failings through some means (such as reworking material, taking advantage of a further assessment opportunity, etc.). However, if by the end of a unit or course the learner has still not been able to achieve all of the pass criteria, this would be considered 'completed' but not 'achieved/passed'. This assumes that the programme team is satisfied that the learner has attempted the assessment(s) instruments. If the learner has not attempted assessment, then the programme team could indicate that the unit/course had not been completed by the learner, and in such cases the qualification certificate would be withheld.

How many times can a learner rework or resit an assignment?

The issue here is the validity of the assessment instrument. If a learner is simply going round and round on a single task or activity brief, then the validity of the assessment must come into question and the tutor should consider the need for an alternative assessment instrument.

If the assignment is prompting learning, then that is what the course is about in the first place and therefore rework is to be encouraged whenever applicable.

The final assessment evidence simply needs to be a valid and reliable measure of the learner's current level of achievement against the outcomes and criteria of the unit.

Improving grades

Lack of achievement can usually be attributed to poor attendance and the non-production of or inadequate work for assessment. Ongoing assessment through teaching tutorials and portfolio reviews using the unit assessment criteria can highlight weaknesses in performance that can be addressed through individual learning plans.

Resubmitting work

Learners should be allowed to resubmit their work for further assessment; however this cannot go on indefinitely. The diagram above indicates the recommended schedule of resubmission of work. All learners should be treated the same and the rules and regulations regarding the programme should be clearly spelt out during the induction period.

Appendix: a sample assignment

A sample assignment follows for **Unit 1: Health and Safety in the Engineering Workplace**.

All assignments you set for your learners must be internally verified

It is intended that sample assignments are used as examples of good practice. However, they may not be entirely appropriate for every learner in every centre. You are advised to make suitable amendments to sample assignments in response to your own centre's requirements to meet the needs of your learners. All sample assignments used, whether amended or not, must be internally verified by a suitable person at your centre.

Assignment design must consider the practical nature of the unit, therefore access to a workshop environment and the range of tools and equipment required to carry out engineering work activities is essential.

It would not be appropriate for this unit to be assessed without practical application. For example, identifying hazards and the risks associated with an engineering activity from an image (eg drawing, sketch, photograph) does not have the same value that real practical experience in a working environment can bring.

You should seek innovative ways of bringing the assignment to life for the learner. Experience and practice is after all the best way to embed learning.

Learners could be provided with a range of simple tasks to complete to enable them to practice their health and safety skills and to provide an opportunity for support and guidance to be given prior to assessment. These tasks could be based on:

- handling and using equipment safely
- selecting Personal Protective Equipment (PPE)
- identifying hazards prior to carrying out the work activity.

You will need to consider how to support the process evidence. For example, tutor or witness observation in the work environment could be used, supported by verbal questioning of the learner before they begin the manufacturing activity to produce the final component. Another way would be to use a task sheet, logbook or a diary in which the learner can note the PPE they have selected for the engineering task undertaken and the identification of the hazards and risks associated with that task. It would then be possible for the tutor, through observation and/or verbal questioning, to easily verify this evidence. Such supporting activity evidence would validate the tutor or witness observation/oral questioning records to confirm that the learner has met the relevant assessment criteria.

All learners are different and will approach their assignments in different ways

The sample assignment that follows shows how one learner answered a brief to achieve pass, merit and distinction level criteria. The learner work shows just one way in which grading criteria can be evidenced. There are no standard or set answers. If your assignment is fit for purpose, and if your learners produce the required evidence for each task, then they will achieve the grading criteria covered by the assignment.

Sample assignment front sheet

This front sheet must be completed by the learner where appropriate and included with the work submitted for assessment.

Learner name	Assessor name
David Webber	Tracey Thomson

Date issued	Completion date	Submitted on
12 October 2010	15 November 2010	15 November 2010

Qualification	Unit
BTEC Level 3 National Engineering	Unit 1 Health and Safety in the Engineering Workplace

Assignment title	Controlling hazards and risks in the workplace

In this assessment you will have opportunities to provide evidence against the following criteria.
Indicate the page numbers where the evidence can be found.

Criteria reference	To achieve the criteria the evidence must show that the student is able to:	Task no.	Page numbers
P3	describe the methods used to identify hazards in a working environment	1	1
P4	describe how hazards which become risks can be controlled	2a, b	2
P5	carry out a risk assessment on a typical item/area of the working environment	3a	3–5
P6	suggest suitable control measures after a risk assessment has been carried out and state the reasons why they are suitable	3c	3–5
M2	explain the importance of carrying out all parts of a risk assessment in a suitable manner	3b	3–5
M3	explain how control measures are used to prevent accidents	4	6
D1	justify the methods used to deal with hazards in accordance with workplace policies and legal requirements	5	7

Learner declaration

I certify that the work submitted for this assignment is my own and research sources are fully acknowledged.

Learner signature: *David Webber* Date: *12 October 2010*

Sample assignment brief

Unit title	Unit 1: Health and Safety in the Engineering Workplace
Qualification	BTEC Level 3 National Diploma in Engineering
Start date	12 October 2010
Deadline date	15 November 2010
Assessor	Tracey Thomson

Assignment title	Controlling hazards and risks in the workplace

The purpose of this assignment is to provide a framework where the learner:
- knows how to identify and control hazards in the workplace
- is able to carry out a risk assessment and identify control measures.

Scenario
You work as a metal fitter for a small general engineering company and you have been tasked with carrying out a risk assessment of your metal working machine shop. The shop has:
- four lathes;
- an electrically powered guillotine;
- an electrically powered pillar drill; and
- an abrasive wheel grinding machine (used for sharpening tools).

There is also a storage area and racking for metal bar and sheet metal; the metal bar is used for lathe work and the large sections of sheet metal have to be guillotined to provide suitably sized work pieces.

The shop is equipped with appropriate first aid and fire points. Adjacent to the machine shop there is a physically separate tool store, restroom, washroom and toilets. These are not considered part of the machine shop and do not need to be risk assessed at this time.

There is a total of one new fitter, four experienced fitters (including yourself) and one supervisor who work regularly in and around the machine shop.

Task 1
Describe the methods/procedure you will adopt to identify the hazards in your metal working machine shop.

This provides evidence for P3

Task 2
Define 'hazard' and 'risk' in terms of health and safety.
Identify the hazards for any one piece of machinery in your metal working shop and for those hazards that offer most risk, describe how they are controlled.

This provides evidence for P4

Task 3
Using the five-step method, carry out a risk assessment for all machinery and areas of your metalwork machine shop, recording your findings in a suitable manner, using a standardised form of risk assessment paperwork. (P5)

Explain the importance of carrying out all parts of your workshop risk assessment in a suitable standardised manner, including the implications for not following a suitable procedure. (M2)

After carrying out your risk assessment, suggest suitable control measures for the workshop area as a whole, giving reasons as to their suitability. (P6)

This provides evidence for P5, P6 and M2

Task 4
Explain in general terms how control measures are used to prevent accidents.

This provides evidence for M3

Task 5
Justify, in writing, the methods used to deal with the hazards in your metalwork shop, in accordance with local policies and legal requirements.

This provides evidence for D1

Sources of information
HSE, *Essentials of health and safety at work* Fourth edition 2006 – ISBN 0717661792
http://www.hse.gov.uk

This brief has beeen verified as being fit for purpose			
Assessor	Tracey Thomson		
Signature	*Tracey Thomson*	**Date**	*1 October 2010*
Internal verifier	Fred Brown		
Signature	*Fred Brown*	**Date**	*1 October 2010*

Sample internal verification of assignment brief

Qualification	BTEC Level 3 National Diploma in Engineering
Unit	Unit 1: Health and Safety in the Engineering Workplace
Assessor	Tracey Thomson

Internal verifier checklist		Comments
Are accurate programme details shown?	Y	
Are accurate unit details shown?	Y	
Are clear deadlines for assessment given?	Y	
Is this assignment for whole or part of a unit?	P	
Are assessment criteria to be addressed listed?	Y	
Does each task show which criteria are being addressed?	Y	
Are these criteria actually addressed by the tasks?	Y	
Is it clear what evidence the learner needs to generate?	Y	
Are the activities appropriate?	Y	It is assumed that this scenario provides the opportunity for a real risk assessment to be carried out, the scenario being contextualised to reflect the actual workshop in which the cohort is being taught. A real risk assessment needs to be carried out by the learner to ensure the assignment criteria are met.
Is there a scenario or vocational context?	Y	It is assumed that this is a live scenario, where the location may be taken as presented or location geography/equipment may be modified to suit the particular cohort (eg Motor Vehicle, Electrical, Electronic etc).
Is the language and presentation appropriate?	Y	
Is the timescale for the assignment appropriate?	Y	
Overall is the assignment fit for purpose?	Y	Subject only to confirmation of the above assumptions
* If "No" is recorded and the Internal Verifier recommends remedial action before the brief is issued, the Assessor and the Internal Verifier should confirm that the action has been undertaken		

Internal verifier	Fred Brown		
Signature	*Fred Brown*	**Date**	*1 October 2010*

Action required:
Assessor to confirm that the environment described in the scenario is an accurate description of the centre workshop or workplace environment of the learner, so that a real risk assessment may be carried out.
Action taken:
Assessor has confirmed that this is an accurate description of the centre workshop where learners will carry out practical risk assessment activities. Alternative scenarios are being developed for those who are able to carry out a risk assessment at their place of work.

Assessor	Tracey Thomson		
Signature	*Tracey Thomson*	**Date**	*1 October 2010*
Internal verifier	Fred Brown		
Signature	*Fred Brown*	**Date**	*1 October 2010*

Sample learner work

Sample learner work: page 1

Health and Safety in the Engineering Workplace

Task 1 (P3)

Describe the methods/procedure you will adopt to identify the hazards in your metal working machine shop.

In order to identify hazards I will first consult the HSE guidance "Five steps to risk assessment" (http://www.hse.gov.uk/risk/fivesteps.htm). Also I will consult the guidance provided in the HSE information leaflet: *using work equipment safely* (INDG 229), where I happen to know there is some good H&S information on engineering machines.

Then following HSE guidance, I will:

- walk around all the areas in the workshop where the fitters work and where visitors walk, noting things that might pose a risk, taking into account the above guidance and the guidance given in the HSE book, *Essentials of health and safety at work*
- talk with our H&S representative and shop supervisor concerning any particular problems/hazards they may be aware of, that might pose a risk
- look at our accident book, to see the problems we have had in the past
- write down on our risk assessment form, the people that could be harmed by the hazards and how they might be harmed
- write down on the same form, what is being done to control the hazards and my suggestions where the control measures seemed to be inadequate to meet H&S requirements
- discuss my findings with our supervisor and H&S representative, then after considering their advice and using their help, I would put my findings into practice.

Sample learner work: page 2

Task 2 (P4)

a) Define "hazard" and "risk" in terms of health and safety.

A ***hazard*** is anything that might cause harm, such as working on ladders, spilt liquids or machine cutting tools. ***Risk*** is the chance of harm being done, as well as how serious that harm could be.

b) Identify the hazards for any one piece of machinery in your metal working shop and for those hazards that offer most risk, describe how they are controlled.

Centre Lathe hazards: The centre lathe has moving parts and uses sharp cutting tools so hazards are:
1) possible entanglement of hair, loose clothing, dangling jewellery etc
2) crush injuries from moving work piece or platform
3) people can be struck by moving parts or ejected material
4) cuts and severing injuries due to cutting tools and ejected swarf
5) shock hazard from electrical supply.

1) Ensure protective cap is used to keep back hair, ensure no dangling jewellery is worn, rings etc. are taped up or removed, protective clothing is buttoned up, pockets are zipped up and no loose objects protrude.
2) Centre lathe is guarded from dangerous moving parts and warning notices posted.
3) Ejected material and moving parts are guided away or shielded from walkways and the machine operator.
4) Suitable guarding and warning notices (placed on or near the machine).
5) Motor cabling should be shielded, a supply circuit breaker should be provided at the power distribution point and a power emergency trip switch should be attached to the lathe body and clearly marked.

Sample learner work: page 3

Task 3 (P5, P6 and M2)

a) Using the five-step method, carry out a risk assessment for all machinery and areas of your metalwork machine shop, recording your findings in a suitable manner, using a standardised form of risk assessment paperwork. (P5)

Please see risk assessment report form attached.

b) Explain the importance of carrying out all parts of your workshop risk assessment in a suitable standardised manner, including the implications for not following a suitable procedure. (M2)

It is important to carry out a risk assessment properly so that nothing gets forgotten and people do not have accidents.

c) After carrying out your risk assessment, suggest suitable control measures for the workshop area as a whole, giving reasons as to their suitability. (P6)

Please see risk assessment report form attached.

Sample learner work: page 4

Risk assessment report form

What are the hazards?	Who might be harmed and how?	What are we already doing? (Control measures)
Machinery (Lathes Pillar drill Abrasive wheel Grinding machine Guillotine)	Fitters and others may suffer serious injury from unguarded moving parts of machinery	• All dangerous parts of all machines guarded to manufacturers standards • Machinery guards checked monthly and maintained in good condition • All experienced fitters trained and certified as competent to work on lathes, pillar drill, abrasive grinder and guillotine • All workshop personnel are required to wear safety shoes, protective clothing and eye protection when operating machines • Warning and operating notices posted at machines • All machines fitted with electrical isolation and emergency stop switches • Supervisor trained and experienced with all machines, ensures that all fitters carry out pre-use daily checks, prior to operating machines
Manual handling	Fitters and others may suffer back injury and cut injuries when handling bar stock and large sheets of metal	• All fitters trained in manual handling • Suitable gauntlets and other lifting aids placed in prominent position
Electricity	Fitters/maintainers/ contractors may suffer shock and burn injuries from faulty electrical supplies to machines and building electrical installations	• Maintainers and contractors and relevant others discuss electrical safety before each job begins to ensure that relevant machinery, circuits etc are isolated and locked-off, during job • Electrical installation and all electrical supplies to machines is inspected and maintained to a planned schedule
Workshop General		
Slips and trips	Fitters, contractors and visitors may suffer injuries if they slip on spillages, or trip over objects and fall	• Procedures for good housekeeping adhered to (eg procedures for oil and coolant spillages etc) • Floors generally in good condition • Walkways clearly marked • Good lighting throughout
Fire	Any staff, contractors, visitors trapped in workshop could suffer fatal injury from smoke inhalation or burns	• Fire risk assessment done as at www.fire.gov.uk/workplace+safety and necessary action • All contracting staff and other visiting workers, told of fire and evacuation policy, before work begins
Working at height	Maintenance staff and/ or contractors may suffer severe injury, if they fall from height (eg when changing light filaments or refurbishing building/ fittings)	• All maintenance and contracting jobs involved with working at height, discussed with supervisor and other relevant staff and a safe system of work agreed before job begins • Access equipment (eg ladders, tower scaffold) kept in workshop, checked before use and stored safely after use

Sample learner work: page 5

What further action is necessary?	Action by whom?	Action by when	Done
• No further action • No further action • Arrange lathe familiarisation and operating course and abrasive wheels course, for new fitter • No further action • No further action • No further action • No further action	Supervisor	01/09/2010	Booked for 03/09/2010
• No further action • Permanent notice to be posted by sheet metal must be a two man lifting operation, when moving and positioning large sheets of metal for guillotining	Self	04/09/2010	Notice made up and positioned 02/09/2010
• No further action • No further action			
• No further action • No further action • No further action • No further action • No further action • No further action • No further action • No further action			

Sample learner work: page 6

Task 4 (M3)

Explain in general terms how control measures are used to prevent accidents.

Control measures in general are designed to consider all workplace hazards and put in place not only immediate actions, but also policies and procedures that reduce or if possible eliminate the risk associated with these hazards developing into safety incidents or accidents.

It is therefore not good enough, for example, just to post a notice warning operators of the need to wear safety glasses when using a grinding machine. There also need to be control measures that provide operator training and general safety awareness, as well as a means of checking that the immediate safety control measures at the machine are complied with.

In my own workshop it can be seen from my risk assessment report that eliminating or minimising the risk at the workface depends on other control measures that have often been introduced remote from the machine or hazard. An example is the control measures introduced for electrical hazards, whereby the building electrical installation and electrical wiring to the machines not only comply with the wiring regulations and have the appropriate circuit isolation devices and warning notices but are also subject to regular inspection, as part of a planned schedule.

Thus the control measures policy and procedures ensure that there is a chain or series of control measures in place, so that if one gets overlooked, although risk may be increased, providing the other control measures in the series are adhered to, an accident or serious incident is unlikely.

Sample learner work: page 7

Task 5 (D1)

Justify, in writing, the methods used to deal with the hazards in your metalwork shop, in accordance with local policies and legal requirements.

With reference to my risk assessment report I have divided the identified hazards into four areas: machinery, manual handling, electricity and the workshop in general. Under each of these hazard headings, I have given reasons from both a technical and legislative perspective, in an attempt to justify the use of these methods, in our workshop.

Machinery

- Guards
- Checks
- Jigs
- Fixtures
- Eye protection
- Training
- Maintenance
- Protective clothing

To ensure safe operation of machines, protection of fitters and others against the ejection of swarf, sparks from grinding machine, movement of work piece and machine parts and entrapment of loose clothing. The use of these methods also ensures that employers and employees follow best safe practice, execute their responsibilities and comply with HSE guidance and H&S legislation, including the Health and Safety at Work Act 1974, Personal Protective Equipment Regulation 1992, Management of Health and Safety at Work Regulations 1999, Provision and Use of Work Equipment Regulations (PUWER) 1998.

Manual handling

Use of:

- lifting aids
- gloves
- safety footwear
- other protective clothing
- warning notices

To help prevent lift injuries and cuts from the sheet metal edges and to ensure safe feed of sheet metal through guillotine. The use of these methods also ensures that employees and employers execute their responsibilities and comply with the H&S legislation listed above (under machinery). In addition these control methods also ensure that the company and individuals comply with the Manual Handling Operations Regulations 1992, as well as following best practice as laid down in HSE guidance pamphlets.

Electricity

- Isolation switches
- Emergency stop switches
- Circuit breakers
- Isolation procedures
- Regular inspection of electrical installations
- Cabling, shrouds and machine connections/fittings

To help prevent injuries resulting from electric shock and electrical equipment burns. In addition these control methods also ensure that employees and employers execute their responsibilities and comply with the H&S legislation listed above (under machinery), as well as ensuring compliance with the Electricity at Work Regulations 1998.

Sample learner work: page 8

Workshop area

- Good housekeeping procedures
- Fire risk assessment
- Evacuation procedures
- Working at height equipment and procedures

To help prevent injuries to all employees, building maintenance workers and contractors from slips or trips, fire/burn and falls from height. In addition, these control methods ensure that employees, third party contractors and employers execute their responsibilities and comply with H&S legislation listed above (under machinery) as well as ensuring compliance with the Workplace (Health, Safety and Welfare) Regulations 1992 and the Work at Height Regulation 2005.

Sample assessor's comments

Qualification	BTEC Level 3 National Diploma in Engineering	**Year**	2010–2011
Unit number and title	Unit 1: Health and Safety in the Engineering Workplace	**Learner name**	David Webber

Grading criteria	Achieved?
P3 Describe the methods used to identify hazards in a working environment	Y
P4 Describe how hazards which become risks can be controlled	Y
P5 Carry out a risk assessment on a typical item/area of the working environment	Y
P6 Suggest suitable control measures after a risk assessment has been carried out and state the reasons why they are suitable	Y
M2 Explain the importance of carrying out all parts of a risk assessment in a suitable manner	N
M3 Explain how control measures are used to control accidents	Y
D1 Justify the methods used to deal with hazards in accordance with workplace policies and legal requirements	Y

Learner feedback

It was difficult to find outside information for the risk assessment.

Assessor feedback

You have given clear, comprehensive and relevant answers to tasks 1 and 2 that meet the criteria P3 and P4 in full.

Your risk assessment report has been logically presented and you have clearly followed the HSE guidance as to how a risk assessment should be carried out and reported on. You have included a range of control measures in your report and have therefore achieved criteria P5 and P6. My only comment is that you did not mention specifically anything on your workshops control measures for first aid, such as the keeping of an up-to-date accident book, eye wash facilities and a list of qualified/duty first aid personnel. However, that aside, all other areas of H&S were covered.

Your answer to task 3b was very brief and rather disappointing, when compared with all other aspects of your work. It is a shame that you did not approach me for guidance on this task before submitting your assignment if you were having difficulties. What you have submitted in answer to this task unfortunately does not meet the criteria for achievement of M2. There will be an opportunity for you to meet M2, when you are given assignment 3. In the meantime you would be wise to research the importance of carrying out a risk assessment. I will speak to you in class about this topic when you receive this feedback.

Your answers to tasks 4 and 5 are excellent, and your depth of understanding on control methods and the justification for your company policies and procedures for such methods is outstanding and clearly meets the criteria for M3 and D1. Well done!

Action plan

Assessor signature	*Tracey Thomson*	**Date**	*20 Nov 2010*
Learner signature	*David Webber*	**Date**	*20 Nov 2010*

Sample internal verification of assessment decisions

Qualification	BTEC Level 3 National Diploma in Engineering		
Assessor	Tracey Thomson		
Unit(s)	Unit 1: Health and Safety in the Engineering Workplace		
Assignment title	Controlling hazards and risks in the workplace		
Learner's name	David Webber		
Which criteria has the assessor awarded?	**Pass** P3, P4, P5, P6 Yes	**Merit** M3 Yes	**Distinction** D1 Yes
Do the criteria awarded match those targeted by the assignment brief?	Yes Details: The assessor has awarded the correct criteria for the work that has been submitted.		
Has the work been assessed accurately?	Yes.		
Is the feedback to the learner: **Constructive?** **Linked to relevant grading criteria?** **Identifying opportunities for improved performance?**	Yes. David has produced a first class piece of work, with one exception. The evidence provided to meet M2 was very scant, even though there were clearly chances given by the assessor to discuss this work prior to submission. This does not seem to have been taken up by David. The assessor will give verbal as well as written feedback, concerning this aspect of his work. The assessor has provided detailed written feedback on all other aspects of this assignment and pointed out to David how his risk assessment report might have been improved upon. The learner has been advised that there will be another opportunity to achieve an M2 grade, in a later assignment, that completes the unit coverage.		
Does the grading decision need amending?	No.		
Remedial action taken			
Internal verifier name	Fred Brown		
Internal verifier signature	*Fred Brown*	**Date**	*23 November 2010*
Confirm action completed			
Assessor name	Tracey Thomson		
Assessor signature	*Tracey Thomson*	**Date**	*23 November 2010*

ENGINEERING LEVEL 3

BTEC National

This teaching support guide will help you get started with your BTEC delivery. It includes:

- An overview on planning course delivery: Should I teach unit-by-unit? What resources will I need? How should I induct my learners?
- A comparison chart to show how the specification has changed, unit by unit
- Ideas for tracking learner progress
- A sample scheme of work
- Hints and tips on good practice
- A walk through the assessment process, including a sample assignment with learner work and grading
- Frequently asked questions

Teaching BTEC will give you the confidence to guide your learners through their BTEC course and achieve their highest grades.

Qualifications covered by this booklet:

- BTEC Level 3 qualifications in Mechanical Engineering
- BTEC Level 3 qualifications in Manufacturing Engineering
- BTEC Level 3 qualifications in Operations and Maintenance Engineering

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