

Edexcel BTEC Level 6 Diplomas in Engineering (QCF)

Specification

First teaching June 2012

Issue 4

Edexcel BTEC Level 6 Subsidiary Diploma, Diploma and Extended Diploma in Engineering (Mechanical Engineering) (QCF)

Edexcel BTEC Level 6 Subsidiary Diploma, Diploma and Extended Diploma in Engineering (Electrical and Electronic Engineering) (QCF)

Edexcel BTEC Level 6 Subsidiary Diploma, Diploma and Extended Diploma in Engineering (Manufacturing Engineering) (QCF)

Edexcel BTEC Level 6 Subsidiary Diploma, Diploma and Extended Diploma in Engineering (Aeronautical Engineering) (QCF)

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Authorised by Martin Stretton

Prepared by Sara Furness

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Purpose of this specification

This specification sets out:

- the qualifications' objectives
- any other qualification that a learner must have completed before taking these qualifications
- any prior knowledge, skills or understanding that a learner needs before taking these qualifications
- units that a learner must have completed before the qualification will be awarded and any optional routes
- any other requirements that a learner must have satisfied before they will be assessed or before the qualification will be awarded
- the knowledge, skills and understanding that will be assessed as part of the qualifications (giving a clear indication of their coverage and depth)
- the method of any assessment and any associated requirements relating to it
- the criteria against which learners' level of attainment will be measured (such as assessment criteria).

1 Introducing Edexcel BTEC Level 6 Diplomas in Engineering (QCF)

What are Edexcel BTEC Level 6 Diplomas in Engineering?

This suite of Edexcel BTEC Level 6 Subsidiary Diplomas, Diplomas and Extended Diplomas in Mechanical, Electrical and Electronic, Manufacturing or Aeronautical Engineering is aimed at learners who have achieved an Edexcel BTEC Level 4 HNC Diploma and an Edexcel BTEC Level 5 HND Diploma or Foundation degree in the respective engineering discipline and who wish to achieve Incorporated Engineering (IEng) status.

The Edexcel BTEC Level 6 Diplomas in Engineering provide detailed and up-to-date knowledge and understanding of engineering principles, practice and processes. They focus on designing products, systems and processes to meet defined needs, and maintaining and managing current technology at peak efficiency. The qualifications enable practical skills development alongside the development of the knowledge and understanding required to prepare for/progress in employment in a chosen specialist area of the engineering sector.

In developing the Edexcel BTEC Level 6 Diplomas in Engineering, reference has been made to the Engineering Council's guidance on further learning that holders of Edexcel BTEC Level 5 HND Diplomas need to progress to IEng status. This guidance states the need for further learning of at least 60 credits at level 6.

The Edexcel BTEC Level 6 Subsidiary Diploma (60 credits), Diploma (90 credits) and Extended Diploma in Engineering (120 credits) enable learners the possibility of IEng registration. The Edexcel BTEC Level 6 Extended Diploma in Engineering also provides the learners the opportunity to achieve Chartered Engineering (CEng) status at a later date if their career develops appropriately.

Learners wishing to progress to Chartered Engineering (CEng) registration should note that they would be considered as an individual route applicant. The professional institutions relevant to their engineering discipline would make an assessment of their qualification(s) to determine what further knowledge and understanding would have to be demonstrated before the learner can embark on further learning to Masters level.

These qualifications also form an integral part of SEMTA's new Higher Apprenticeship in Advanced Manufacturing. The concept of the Higher Apprenticeship model is about self-contained frameworks at levels 4 and 6. Apprentices may complete the level 4 framework and then return to complete the level 6 framework after a break.

2 Qualification summaries and key information

| | |
|--|--|
| Qualification title | Edexcel BTEC Level 6 Subsidiary Diploma in Engineering (Mechanical Engineering) (QCF) |
| QCF Qualification Number (QN) | 600/4625/9 |
| Qualification framework | Qualifications and Credit Framework (QCF) |
| Date registrations can be made | 01/06/2012 |
| Age range that the qualification is approved for | 18+ |
| Credit value | 60 |
| Assessment | Centre-devised assessment (internal assessment) |
| Guided learning hours (GLH) | 60 GLH per 15-credit unit. This 60-credit qualification will require a total of approximately 240 GLH. |
| Grading information | The qualification and units are pass only. |
| Entry requirements | Learners starting this level 6 qualification must have successfully completed the following prior learning. Either: an Edexcel BTEC Level 5 HND Diploma in Mechanical Engineering Or: a Foundation Degree in Mechanical Engineering (that is a valid proxy qualification). For instructions on how to make proxy claims on Edexcel Online, please see <i>Making portfolio or proxy claims</i> on the Edexcel website (www.edexcel.com). |

| Qualification title | Edexcel BTEC Level 6 Diploma in Engineering (Mechanical Engineering) (QCF) |
|--|---|
| QCF Qualification Number (QN) | 600/4626/0 |
| Qualification framework | Qualifications and Credit Framework (QCF) |
| Date registrations can be made | 01/06/2012 |
| Age range that the qualification is approved for | 18+ |
| Credit value | 90 |
| Assessment | Centre-devised assessment (internal assessment) |
| Guided learning hours (GLH) | 60 GLH per 15-credit unit (other units with larger credit values will be calculated on a pro rata basis). This 90-credit qualification will require a total of approximately 360 GLH. |
| Grading information | The qualification and units are pass only. |
| Entry requirements | <p>Learners starting this level 6 qualification must have successfully completed the following prior learning.</p> <p>Either:</p> <p>an Edexcel BTEC Level 5 HND Diploma in Mechanical Engineering</p> <p>Or:</p> <p>a Foundation Degree in Mechanical Engineering (that is a valid proxy qualification). For instructions on how to make proxy claims on Edexcel Online, please see <i>Making portfolio or proxy claims</i> on the Edexcel website (www.edexcel.com).</p> |

| Qualification title | Edexcel BTEC Level 6 Extended Diploma in Engineering (Mechanical Engineering) (QCF) |
|--|--|
| QCF Qualification Number (QN) | 600/4639/9 |
| Qualification framework | Qualifications and Credit Framework (QCF) |
| Date registrations can be made | 01/06/2012 |
| Age range that the qualification is approved for | 18+ |
| Credit value | 120 |
| Assessment | Centre-devised assessment (internal assessment) |
| Guided learning hours (GLH) | 60 GLH per 15-credit unit (other units with larger credit values will be calculated on a pro rata basis). This 120-credit qualification will require a total of approximately 480 GLH. |
| Grading information | The qualification and units are pass only. |
| Entry requirements | <p>Learners starting on this level 6 qualification must have successfully completed the following prior learning:</p> <p>Either:</p> <p>an Edexcel BTEC Level 5 HND Diploma in Mechanical Engineering</p> <p>Or:</p> <p>a Foundation Degree in Mechanical Engineering (that is a valid proxy qualification). For instructions on how to make proxy claims on Edexcel Online, please see <i>Making portfolio or proxy claims</i> on the Edexcel website (www.edexcel.com).</p> |

| | |
|--|---|
| Qualification title | Edexcel BTEC Level 6 Subsidiary Diploma in Engineering (Electrical and Electronic Engineering) (QCF) |
| QCF Qualification Number (QN) | 600/4625/9 |
| Qualification framework | Qualifications and Credit Framework (QCF) |
| Date registrations can be made | 01/06/2012 |
| Age range that the qualification is approved for | 18+ |
| Credit value | 60 |
| Assessment | Centre-devised assessment (internal assessment) |
| Guided learning hours (GLH) | 60 GLH per 15-credit unit. This 60-credit qualification will require a total of approximately 240 GLH. |
| Grading information | The qualification and units are pass only. |
| Entry requirements | <p>Learners starting this level 6 qualification must have successfully completed the following prior learning.</p> <p>Either:</p> <p>an Edexcel BTEC Level 5 HND Diploma in Electrical and Electronic Engineering</p> <p>Or:</p> <p>a Foundation Degree in Electrical and Electronic Engineering (that is a valid proxy qualification). For instructions on how to make proxy claims on Edexcel Online, please see <i>Making portfolio or proxy claims</i> on the Edexcel website (www.edexcel.com).</p> |

| | |
|--|---|
| Qualification title | Edexcel BTEC Level 6 Diploma in Engineering (Electrical and Electronic Engineering) (QCF) |
| QCF Qualification Number (QN) | 600/4626/0 |
| Qualification framework | Qualifications and Credit Framework (QCF) |
| Date registrations can be made | 01/06/2012 |
| Age range that the qualification is approved for | 18+ |
| Credit value | 90 |
| Assessment | Centre-devised assessment (internal assessment) |
| Guided learning hours (GLH) | 60 GLH per 15-credit unit (other units with larger credit values will be calculated on a pro rata basis). This 90-credit qualification will require a total of approximately 360 GLH. |
| Grading information | The qualification and units are pass only. |
| Entry requirements | <p>Learners starting this level 6 qualification must have successfully completed the following prior learning.</p> <p>Either:</p> <p>an Edexcel BTEC Level 5 HND Diploma in Electrical and Electronic Engineering</p> <p>Or:</p> <p>a Foundation Degree in Electrical and Electronic Engineering (that is a valid proxy qualification). For instructions on how to make proxy claims on Edexcel Online, please see <i>Making portfolio or proxy claims</i> on the Edexcel website (www.edexcel.com).</p> |

| | |
|--|---|
| Qualification title | Edexcel BTEC Level 6 Extended Diploma in Engineering (Electrical and Electronic Engineering) (QCF) |
| QCF Qualification Number (QN) | 600/4639/9 |
| Qualification framework | Qualifications and Credit Framework (QCF) |
| Date registrations can be made | 01/06/2012 |
| Age range that the qualification is approved for | 18+ |
| Credit value | 120 |
| Assessment | Centre-devised assessment (internal assessment) |
| Guided learning hours (GLH) | 60 GLH per 15-credit unit (other units with larger credit values will be calculated on a pro rata basis). This 120-credit qualification will require a total of approximately 480 GLH. |
| Grading information | The qualification and units are pass only. |
| Entry requirements | <p>Learners starting this level 6 qualification must have successfully completed the following prior learning.</p> <p>Either:</p> <p>an Edexcel BTEC Level 5 HND Diploma in Electrical and Electronic Engineering</p> <p>Or:</p> <p>a Foundation Degree in Electrical and Electronic Engineering (that is a valid proxy qualification). For instructions on how to make proxy claims on Edexcel Online, please see <i>Making portfolio or proxy claims</i> on the Edexcel website (www.edexcel.com).</p> |

| | |
|--|---|
| Qualification title | Edexcel BTEC Level 6 Subsidiary Diploma in Engineering (Manufacturing Engineering) (QCF) |
| QCF Qualification Number (QN) | 600/4625/9 |
| Qualification framework | Qualifications and Credit Framework (QCF) |
| Date registrations can be made | 01/06/2012 |
| Age range that the qualification is approved for | 18+ |
| Credit value | 60 |
| Assessment | Centre-devised assessment (internal assessment) |
| Guided learning hours (GLH) | 60 GLH per 15-credit unit. This 60-credit qualification will require a total of approximately 240 GLH. |
| Grading information | The qualification and units are pass only. |
| Entry requirements | <p>Learners starting this level 6 qualification must have successfully completed the following prior learning.</p> <p>Either:</p> <p>an Edexcel BTEC Level 5 HND Diploma in Manufacturing Engineering</p> <p>Or:</p> <p>a Foundation Degree in Manufacturing Engineering (that is a valid proxy qualification). For instructions on how to make proxy claims on Edexcel Online, please see <i>Making portfolio or proxy claims</i> on the Edexcel website (www.edexcel.com).</p> |

| Qualification title | Edexcel BTEC Level 6 Diploma in Engineering (Manufacturing Engineering) (QCF) |
|--|---|
| QCF Qualification Number (QN) | 600/4626/0 |
| Qualification framework | Qualifications and Credit Framework (QCF) |
| Date registrations can be made | 01/06/2012 |
| Age range that the qualification is approved for | 18+ |
| Credit value | 90 |
| Assessment | Centre-devised assessment (internal assessment) |
| Guided learning hours (GLH) | 60 GLH per 15-credit unit (other units with larger credit values will be calculated on a pro rata basis). This 90-credit qualification will require a total of approximately 360 GLH. |
| Grading information | The qualification and units are pass only. |
| Entry requirements | <p>Learners starting this level 6 qualification must have successfully completed the following prior learning.</p> <p>Either:</p> <p>an Edexcel BTEC Level 5 HND Diploma in Manufacturing Engineering</p> <p>Or:</p> <p>a Foundation Degree in Manufacturing Engineering (that is a valid proxy qualification). For instructions on how to make proxy claims on Edexcel Online, please see <i>Making portfolio or proxy claims</i> on the Edexcel website (www.edexcel.com).</p> |

| | |
|--|---|
| Qualification title | Edexcel BTEC Level 6 Extended Diploma in Engineering (Manufacturing Engineering) (QCF) |
| QCF Qualification Number (QN) | 600/4639/9 |
| Qualification framework | Qualifications and Credit Framework (QCF) |
| Date registrations can be made | 01/06/2012 |
| Age range that the qualification is approved for | 18+ |
| Credit value | 120 |
| Assessment | Centre-devised assessment (internal assessment) |
| Guided learning hours (GLH) | 60 GLH per 15-credit unit (other units with larger credit values will be calculated on a pro rata basis). This 120-credit qualification will require a total of approximately 480 GLH. |
| Grading information | The qualification and units are pass only. |
| Entry requirements | <p>Learners starting this level 6 qualification must have successfully completed the following prior learning.</p> <p>Either:</p> <p>an Edexcel BTEC Level 5 HND Diploma in Manufacturing Engineering</p> <p>Or:</p> <p>a Foundation Degree in Manufacturing Engineering (that is a valid proxy qualification). For instructions on how to make proxy claims on Edexcel Online, please see <i>Making portfolio or proxy claims</i> on the Edexcel website (www.edexcel.com).</p> |

| | |
|--|--|
| Qualification title | Edexcel BTEC Level 6 Subsidiary Diploma in Engineering (Aeronautical Engineering) (QCF) |
| QCF Qualification Number (QN) | 600/4625/9 |
| Qualification framework | Qualifications and Credit Framework (QCF) |
| Date registrations can be made | 01/06/2012 |
| Age range that the qualification is approved for | 18+ |
| Credit value | 60 |
| Assessment | Centre-devised assessment (internal assessment) |
| Guided learning hours (GLH) | 60 GLH per 15-credit unit. This 60-credit qualification will require a total of approximately 240 GLH. |
| Grading information | The qualification and units are pass only. |
| Entry requirements | Learners starting this level 6 qualification must have successfully completed the following prior learning. Either: an Edexcel BTEC Level 5 HND Diploma in Aeronautical Engineering Or: a Foundation Degree in Aeronautical Engineering (that is a valid proxy qualification). For instructions on how to make proxy claims on Edexcel Online, please see <i>Making portfolio or proxy claims</i> on the Edexcel website (www.edexcel.com). |

| Qualification title | Edexcel BTEC Level 6 Diploma in Engineering (Aeronautical Engineering) (QCF) |
|--|---|
| QCF Qualification Number (QN) | 600/4626/0 |
| Qualification framework | Qualifications and Credit Framework (QCF) |
| Date registrations can be made | 01/06/2012 |
| Age range that the qualification is approved for | 18+ |
| Credit value | 90 |
| Assessment | Centre-devised assessment (internal assessment) |
| Guided learning hours (GLH) | 60 GLH per 15-credit unit (other units with larger credit values will be calculated on a pro rata basis). This 90 credit qualification will require a total of approximately 360 GLH. |
| Grading information | The qualification and units are pass only. |
| Entry requirements | <p>Learners starting this level 6 qualification must have successfully completed the following prior learning.</p> <p>Either:</p> <p>an Edexcel BTEC Level 5 HND Diploma in Aeronautical Engineering</p> <p>Or:</p> <p>a Foundation Degree in Aeronautical Engineering (that is a valid proxy qualification). For instructions on how to make proxy claims on Edexcel Online, please see <i>Making portfolio or proxy claims</i> on the Edexcel website (www.edexcel.com).</p> |

| Qualification title | Edexcel BTEC Level 6 Extended Diploma in Engineering (Aeronautical Engineering) (QCF) |
|--|---|
| QCF Qualification Number (QN) | 600/4639/9 |
| Qualification framework | Qualifications and Credit Framework (QCF) |
| Date registrations can be made | 01/06/2012 |
| Age range that the qualification is approved for | 18+ |
| Credit value | 120 |
| Assessment | Centre-devised assessment (internal assessment) |
| Guided learning hours (GLH) | 60 GLH per 15-credit unit (other units with larger credit values will be calculated on a pro rata basis). This 120-credit qualification will require a total of approximately 480 GLH. |
| Grading information | The qualification and units are pass only. |
| Entry requirements | <p>Learners starting this level 6 qualification must have successfully completed the following prior learning.</p> <p>Either:</p> <p>an Edexcel BTEC Level 5 HND Diploma in Aeronautical Engineering</p> <p>Or:</p> <p>a Foundation Degree in Aeronautical Engineering (that is a valid proxy qualification). For instructions on how to make proxy claims on Edexcel Online, please see <i>Making portfolio or proxy claims</i> on the Edexcel website (www.edexcel.com).</p> |

QCF Qualification Title and Qualification Number

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

The qualification title, QN and URNs are on learners' final certification documentation. Learners need to know this when they are recruited by the centre and registered with Pearson. Further information about certification is in the *Edexcel Information Manual* on our website:
www.edexcel.com/iwantto/Pages/info-manual.aspx

Objective of the qualifications

The Edexcel BTEC Level 6 Diplomas in Engineering (QCF) give learners the opportunity to:

- initiate and carry out projects, make decisions in complex and unpredictable contexts and identify viable solutions to problems
- apply their knowledge and practical skills in the workplace. Full-time learners have the opportunity to do this through formal work placements and part-time learners through their employment experience
- carry out a major project which allows them to develop and agree a research proposal within a vocational context and use established research and analysis techniques to critically evaluate their arguments, assumptions, concepts and data (NB this is not relevant to the Edexcel BTEC Level 6 Subsidiary Diplomas in Engineering)
- progress from Edexcel BTEC Level 5 HND Diplomas in Mechanical, Electrical and Electronic, Manufacturing and Aeronautical Engineering onto a nationally-recognised level 6 qualification.

Progression opportunities through Edexcel qualifications

Learners who have achieved Edexcel BTEC Level 6 Diplomas in Mechanical or Electronic and Electrical Engineering will have the qualities and skills needed for employment as a project engineer, product development engineer, design engineer, design and development engineer, sales engineering specialist, marketing specialist engineer or technical support engineer.

Learners who have achieved Edexcel BTEC Level 6 Diplomas in Manufacturing Engineering will have the qualities and skills needed for employment as a design engineer, product development engineer or production engineer.

Learners who have achieved Edexcel BTEC Level 6 Diplomas in Aeronautical Engineering will have the qualities and skills needed for employment as a flight lieutenant.

The different sizes of the Edexcel Level 6 Subsidiary Diploma, Diploma and Extended Diploma in Engineering enable learners to enter and exit learning as appropriate for their personal requirements and/or career development. See *Annexe A* for further information on progression opportunities.

Industry support and recognition

These qualifications are supported by SEMTA, the Sector Skills Council for Science, Engineering and Manufacturing Technologies and have been developed in consultation with the Engineering Council, The Institution of Engineering and Technology, the Institution of Mechanical Engineers and the Royal Aeronautical Society.

Relationship to the UK Standard for Professional Engineering Competence (UK-SPEC)

These qualifications have been mapped to the Engineering Council's specific learning outcome requirements for Incorporated Engineering (IEng) status. The mapping document in *Annexe B* shows the links between the Edexcel BTEC Level 6 Diplomas in Engineering and the specific learning outcomes for IEng defined in the UK-SPEC.

3 Centre resource requirements

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

General resource requirements

- Centres must have appropriate physical resources (for example equipment, IT, learning materials, teaching rooms) of industry standard for the sector to support the delivery and assessment of the qualifications.
- Centres must have a suitable number of staff involved in the delivery and assessment processes for these qualifications. These staff must also have relevant expertise and occupational experience to deliver and assess the qualifications.
- There must be systems in place to ensure continuing professional development for staff delivering the qualifications.
- Centres must have sufficient managerial resources to enable them to effectively and efficiently undertake the delivery of the qualifications.
- Centres must have appropriate health and safety policies in place relating to the use of equipment by learners.
- Centres must deliver the qualifications in accordance with current equality legislation.

Specific resource requirements

As well as the general resource requirements, there are specific resource requirements that centres must meet. These are set out below:

| Unit | Resources required |
|---|---|
| <i>T2: Power Electronics and Drives</i> | AC and DC motors and suitable measurement equipment. |
| <i>T6: Data Communication and Sensor Networks</i> | When specific industrial networks are covered learners must have access to appropriate hardware and physical media. Alternatively computer networking equipment is sufficient. |
| <i>T7: Modelling and Simulation for Engineers</i> | MATLAB/Simulink. |
| <i>T8: Digital Signal Processing</i> | MATLAB. |
| <i>T9: Control Engineering Design</i> | MATLAB/Simulink. |
| <i>T10: Embedded Systems in Engineering</i> | MATLAB/Simulink. |
| <i>T12: Digital Communications in Engineering</i> | MATLAB. |
| <i>T13: Finite Element Analysis</i> | Learners must have access to computers and software to enable learners to carry out finite element analysis (FEA). Laboratory facilities with equipment and instrumentation are also needed to enable learners to experimentally check the results of simple configurations with results obtained by FEA. |
| <i>T14: Advanced Materials</i> | Learners must have access to suitable material specimens from both light alloys and composites, as well as products and structures produced from these materials. Test equipment to carry out tests that involve metals and composites is also needed. |
| <i>T16: Quality Management in Engineering</i> | Learners must have access to Excel and/or statistical software such as MINITAB. |
| <i>T17: Robotic Systems in Engineering</i> | Learners must have access to real robotic hardware or a high-fidelity simulator such as the Webots simulator from Cyberbotics company, Microsoft Robotics Developer Studio or the open source Player/Stage/Gazebo applications. |

| Unit | Resources required |
|--|--|
| <i>T18: Aircraft Aerodynamics</i> | Learners must have access to low speed wind tunnel facilities, equipped with suitable aerofoil test sections and whole aircraft scale models is essential. Access to an experimental supersonic wind-tunnel is also desirable. |
| <i>T19: Aircraft Structural Analysis</i> | Learners must have access to laboratory fatigue test machine, equipped with at least two different types of material specimens, capable of being subjected to differing cyclic loads. They also need access to aircraft specialist airworthiness publications such as JAR/CS 21, 22 23, 25, 27 or their military AP101 series equivalents. Sight of representative aircraft structures and/or structural components, similar to those being analysed, is desirable to aid learning. |
| <i>T20: Aircraft Conceptual Design</i> | Learners must have access to aircraft specialist airworthiness publications (such as FAA/JAR/CS 23, 25 and/or Def. Stan. 00-970); access to aircraft design data and access to Excel spreadsheet software. |
| <i>T21: Aircraft Reliability Engineering</i> | Learners must have access to Excel spreadsheet software; <i>Practical Reliability Engineering</i> (P D T O'Connor and A Kleyner); aircraft specialist airworthiness publications such as FAR/JAR/CS 23, 25, 27, 29 or their military equivalents. |
| <i>T22: Avionic Systems Engineering</i> | Learners must have access to: <ul style="list-style-type: none"> • representative examples of aircraft communication, navigation and radar systems, including displays, controllers and antennas • avionic test equipment including Radio Frequency (RF) test gear (power meter, modulation meter, digital frequency meter, Standing Wave Radion (SWR) bridge, etc.) • bus analyser compatible with the bus systems in use (eg ARINC 429, ARINC 573, ARINC 629, ARINC 708, MIL-STD-1553B/1773B, FDDI) • antenna test equipment (RF anechoic chamber or outside test range) • appropriate software (eg MATLAB or Scilab) for simulation purposes • ARINC documentation and standards. |
| <i>T23: Flight Dynamics</i> | Learners must have access to MathCAD software and the textbook, <i>Flight Dynamic Principles</i> (M V Cook). Although not essential, access to a Merlin flight simulator (or similar simulation hardware) and/or MATLAB/Simulink software would significantly enhance delivery of this unit. |

| Unit | Resources required |
|--|---|
| <i>T24: Aircraft Gas Turbine Thermo-fluid Dynamics, Design and Performance</i> | Learners need access to spreadsheet software and <i>Gas Turbine Theory</i> (sixth edition) and <i>Gas Turbine Performance</i> (second edition). |
| <i>T25: Aircraft Hydraulic Systems Design and Performance</i> | Learners need access to hydraulic simulation software to meet the unit outcomes. Suitable simulation and modelling packages include (but are not restricted to) Mathworks, 'MATLAB/Simulink SimHydraulics toolbox', 'Flowmaster V7 Hydraulics' and/or 'LMS Imagine Lab AMESim with hydraulic components library'. |

4 Qualification structures

Edexcel BTEC Level 6 Subsidiary Diploma in Engineering (Mechanical Engineering) (QCF)

The Edexcel BTEC Level 6 Subsidiary Diploma in Engineering (Mechanical Engineering) (QCF) consists of a total of 60 level 6 credits. A minimum of 15 credits must be taken from Group A option units for the mechanical engineering specialist pathway and a minimum of 15 credits from Group B broadening studies option units. It is a pre-requisite requirement for entry onto the Subsidiary Diploma that learners have successfully completed the following Higher National units: either J/601/1465 Further Analytical Methods for Engineers or K/601/1412 Advanced Mathematics for Engineering or an equivalent mathematics unit at Level 5.

| Group A Mechanical engineering option units (a minimum of 15 credits must be taken from this group.) | | | | | |
|---|------------|--|--------------|---------------|------------|
| Unit | URN | Option units | Level | Credit | GLH |
| T4 | M/503/7340 | Mechanical Engineering Design | 6 | 15 | 60 |
| T7 | F/503/7343 | Modelling and Simulation for Engineers | 6 | 15 | 60 |
| T9 | Y/503/7381 | Control Engineering Design | 6 | 15 | 60 |
| T11 | H/503/7383 | Sustainability in Engineering | 6 | 15 | 60 |
| T13 | J/503/7411 | Finite Element Analysis | 6 | 15 | 60 |
| T14 | L/503/7412 | Advanced Materials | 6 | 15 | 60 |
| T15 | R/503/7413 | Rapid Prototyping Technologies | 6 | 15 | 60 |
| T16 | Y/503/7414 | Quality Management in Engineering | 6 | 15 | 60 |

Group B broadening studies option units (a minimum of 15 credits must be taken from this group.)

| Unit | URN | Option units | Level | Credit | GLH |
|-------------|------------|---|--------------|---------------|------------|
| BR1 | M/503/7385 | Financial Principles and Techniques for Non-specialists | 6 | 15 | 60 |
| BR2 | T/503/7386 | Strategic Management | 6 | 15 | 60 |
| BR3 | K/503/7269 | Innovation and Creativity in Business | 6 | 15 | 60 |
| BR4 | D/503/7270 | Supply Chain Management | 6 | 15 | 60 |
| BR5 | H/503/7271 | Management and Leadership | 6 | 15 | 60 |
| BR6 | K/503/7272 | Entrepreneurship in Business | 6 | 15 | 60 |
| BR7 | M/503/7273 | Change Management | 6 | 15 | 60 |
| BR8 | A/503/7387 | Applying Lean Principles to Business Operations | 6 | 15 | 60 |
| BR9 | F/503/7388 | Contemporary Issues in Business | 6 | 15 | 60 |
| BR10 | T/503/7274 | Project Management for Engineering | 6 | 15 | 60 |

Edexcel BTEC Level 6 Diploma in Engineering (Mechanical Engineering) (QCF)

The Edexcel BTEC Level 6 Diploma in Engineering (Mechanical Engineering) consists of a total of 90 credits. It includes one mandatory core unit entitled *Major Project* (30 credits) from Group A1. A further minimum 15 credits must be selected from Group A2, the specialist option unit group of the mechanical engineering pathway **and** a minimum of 15 credits from broadening studies option units. The remaining credits may be taken from units listed in Group A2 and/or Group B and/or Group C (a maximum of 30 credits can be selected from Group C). A total of 60 credits must be at Level 6.

Learners must select one of the Level 5 mathematics units from Group C, if they have not already successfully completed the following Higher National units, either J/601/1465 Further Analytical Methods for Engineers or K/601/1412 Advanced Mathematics for Engineering or an equivalent mathematics unit at Level 5.

A maximum of 30 credits can be centre devised at level 5 or above or imported from other QCF Edexcel units at level 5 or above to meet local needs. It is recommended that learners do not select any of the listed level 5 units if they have already achieved these units as part of their Edexcel BTEC Level 4 HNC Diploma or Edexcel BTEC Level 5 HND Diploma in Mechanical Engineering programme. This is because the units chosen should reflect 'further learning' after completion of a Higher National Diploma programme.

| Group A1 (30 credits must be taken from this group.) | | | | | |
|--|------------|--|--------------|---------------|------------|
| Unit | URN | Mandatory core unit | Level | Credit | GLH |
| T1 | Y/503/7221 | Major Project | 6 | 30 | 120 |
| Group A2 mechanical engineering option units (a minimum of 15 credits must be taken from this group.) | | | | | |
| Unit | URN | Option units | Level | Credit | GLH |
| T4 | M/503/7340 | Mechanical Engineering Design | 6 | 15 | 60 |
| T7 | F/503/7343 | Modelling and Simulation for Engineers | 6 | 15 | 60 |
| T9 | Y/503/7381 | Control Engineering Design | 6 | 15 | 60 |
| T11 | H/503/7383 | Sustainability in Engineering | 6 | 15 | 60 |
| T13 | J/503/7411 | Finite Element Analysis | 6 | 15 | 60 |
| T14 | L/503/7412 | Advanced Materials | 6 | 15 | 60 |
| T15 | R/503/7413 | Rapid Prototyping Technologies | 6 | 15 | 60 |
| T16 | Y/503/7414 | Quality Management in Engineering | 6 | 15 | 60 |

Group B broadening studies option units (a minimum of 15 credits must be taken from this group.)

| Unit | URN | Option units | Level | Credit | GLH |
|------|------------|---|-------|--------|-----|
| BR1 | M/503/7385 | Financial Principles and Techniques for Non-specialists | 6 | 15 | 60 |
| BR2 | T/503/7386 | Strategic Management | 6 | 15 | 60 |
| BR3 | K/503/7269 | Innovation and Creativity in Business | 6 | 15 | 60 |
| BR4 | D/503/7270 | Supply Chain Management | 6 | 15 | 60 |
| BR5 | H/503/7271 | Management and Leadership | 6 | 15 | 60 |
| BR6 | K/503/7272 | Entrepreneurship in Business | 6 | 15 | 60 |
| BR7 | M/503/7273 | Change Management | 6 | 15 | 60 |
| BR8 | A/503/7387 | Applying Lean Principles to Business Operations | 6 | 15 | 60 |
| BR9 | F/503/7388 | Contemporary Issues in Business | 6 | 15 | 60 |
| BR10 | T/503/7274 | Project Management for Engineering | 6 | 15 | 60 |

Group C option units (a maximum of 30 credits can be taken from these units from the Edexcel BTEC Level 5 HND Diploma in Mechanical Engineering.)

| Unit | URN | Option units | Level | Credit | GLH |
|------|------------|--|-------|--------|-----|
| HN17 | Y/601/1535 | Business Improvement Techniques | 5 | 15 | 60 |
| HN26 | A/601/0992 | Employability Skills | 5 | 15 | 60 |
| HN27 | T/601/0943 | Personal and Professional Development | 5 | 15 | 60 |
| HN29 | D/601/0998 | Work-based Experience | 5 | 15 | 60 |
| HN31 | A/601/1477 | Value Management | 5 | 15 | 60 |
| HN35 | J/601/1465 | Further Analytical Methods for Engineers | 5 | 15 | 60 |
| HN38 | M/601/1458 | Managing People in Engineering | 5 | 15 | 60 |
| HN52 | R/601/1419 | Energy Management | 5 | 15 | 60 |
| HN59 | K/601/1412 | Advanced Mathematics for Engineering | 5 | 15 | 60 |
| HN60 | H/601/1411 | Dynamics of Machines | 4 | 15 | 60 |

Edexcel BTEC Level 6 Extended Diploma in Engineering (Mechanical Engineering) (QCF)

The Edexcel BTEC Level 6 Extended Diploma in Engineering (Mechanical Engineering) consists of a total of 120 credits, made up of level 6 units only. It includes one mandatory core unit entitled *Major Project* (30 credits) from Group A. A further minimum 30 credits must be selected from Group B1, the specialist option unit group of the mechanical engineering pathway **and** a minimum of 30 credits from Group B2 broadening studies option units. The remaining 30 level 6 credits can be either centre devised units and/or chosen from Group B1/ B2 or imported from other QCF Edexcel units at level 6 or above.

It is a pre-requisite requirement for entry onto the Extended Diploma that learners have successfully completed the following Higher National units, either J/601/1465 Further Analytical Methods for Engineers or K/601/1412 Advanced Mathematics for Engineering or an equivalent mathematics unit at Level 5.

| Group A (30 credits must be taken from this group.) | | | | | |
|--|------------|--|--------------|---------------|------------|
| Unit | URN | Mandatory core unit | Level | Credit | GLH |
| T1 | Y/503/7221 | Major Project | 6 | 30 | 120 |
| Group B1 mechanical engineering option units (a minimum of 30 credits must be taken from this group.) | | | | | |
| Unit | URN | Option units | Level | Credit | GLH |
| T4 | M/503/7340 | Mechanical Engineering Design | 6 | 15 | 60 |
| T7 | F/503/7343 | Modelling and Simulation for Engineers | 6 | 15 | 60 |
| T9 | Y/503/7381 | Control Engineering Design | 6 | 15 | 60 |
| T11 | H/503/7383 | Sustainability in Engineering | 6 | 15 | 60 |
| T13 | J/503/7411 | Finite Element Analysis | 6 | 15 | 60 |
| T14 | L/503/7412 | Advanced Materials | 6 | 15 | 60 |
| T15 | R/503/7413 | Rapid Prototyping Technologies | 6 | 15 | 60 |
| T16 | Y/503/7414 | Quality Management in Engineering | 6 | 15 | 60 |

Group B2 broadening studies option units (a minimum of 30 credits must be taken from this Broadening Studies group.)

| Unit | URN | Optional units | Level | Credit | GLH |
|-------------|------------|---|--------------|---------------|------------|
| BR1 | M/503/7385 | Financial Principles and Techniques for Non-specialists | 6 | 15 | 60 |
| BR2 | T/503/7386 | Strategic Management | 6 | 15 | 60 |
| BR3 | K/503/7269 | Innovation and Creativity in Business | 6 | 15 | 60 |
| BR4 | D/503/7270 | Supply Chain Management | 6 | 15 | 60 |
| BR5 | H/503/7271 | Management and Leadership | 6 | 15 | 60 |
| BR6 | K/503/7272 | Entrepreneurship in Business | 6 | 15 | 60 |
| BR7 | M/503/7273 | Change Management | 6 | 15 | 60 |
| BR8 | A/503/7387 | Applying Lean Principles to Business Operations | 6 | 15 | 60 |
| BR9 | F/503/7388 | Contemporary Issues in Business | 6 | 15 | 60 |
| BR10 | T/503/7274 | Project Management for Engineering | 6 | 15 | 60 |

Edexcel BTEC Level 6 Subsidiary Diploma in Engineering (Electrical and Electronic Engineering) (QCF)

The Edexcel BTEC Level 6 Subsidiary Diploma in Engineering (Electrical and Electronic Engineering) (QCF) consists of a total of 60 level 6 credits. A minimum of 15 credits must be taken from Group A option units for the electrical and electronic specialist pathway and a minimum of 15 credits from Group B broadening studies option units. It is a pre-requisite requirement for entry onto the Subsidiary Diploma credits that learners have successfully completed the following Higher National units: either J/601/1465 Further Analytical Methods for Engineers or K/601/1412 Advanced Mathematics for Engineering or an equivalent mathematics unit at Level 5.

| Group A Electrical and electronic engineering option units (a minimum of 15 credits must be taken from this group.) | | | | | |
|--|------------|--|--------------|---------------|------------|
| Unit | URN | Option units | Level | Credit | GLH |
| T2 | D/503/7222 | Power Electronics and Drives | 6 | 15 | 60 |
| T6 | A/503/7342 | Data Communication and Sensor Networks | 6 | 15 | 60 |
| T7 | F/503/7343 | Modelling and Simulation for Engineers | 6 | 15 | 60 |
| T8 | R/503/7380 | Digital Signal Processing | 6 | 15 | 60 |
| T9 | Y/503/7381 | Control Engineering Design | 6 | 15 | 60 |
| T10 | A/503/8619 | Embedded Systems in Engineering | 6 | 15 | 60 |
| T11 | H/503/7383 | Sustainability in Engineering | 6 | 15 | 60 |
| T12 | K/503/7384 | Digital Communications in Engineering | 6 | 15 | 60 |

Group B broadening studies option units (a minimum of 15 credits must be taken from this group.)

| Unit | URN | Option units | Level | Credit | GLH |
|-------------|------------|---|--------------|---------------|------------|
| BR1 | M/503/7385 | Financial Principles and Techniques for Non-specialists | 6 | 15 | 60 |
| BR2 | T/503/7386 | Strategic Management | 6 | 15 | 60 |
| BR3 | K/503/7269 | Innovation and Creativity in Business | 6 | 15 | 60 |
| BR4 | D/503/7270 | Supply Chain Management | 6 | 15 | 60 |
| BR5 | H/503/7271 | Management and Leadership | 6 | 15 | 60 |
| BR6 | K/503/7272 | Entrepreneurship in Business | 6 | 15 | 60 |
| BR7 | M/503/7273 | Change Management | 6 | 15 | 60 |
| BR8 | A/503/7387 | Applying Lean Principles to Business Operations | 6 | 15 | 60 |
| BR9 | F/503/7388 | Contemporary Issues in Business | 6 | 15 | 60 |
| BR10 | T/503/7274 | Project Management for Engineering | 6 | 15 | 60 |

Edexcel BTEC Level 6 Diploma in Engineering (Electrical and Electronic Engineering) (QCF)

The Edexcel BTEC Level 6 Diploma in Engineering (Electrical and Electronic Engineering) consists of a total of 90 credits. It includes one mandatory core unit entitled *Major Project* (30 credits) from Group A1. A further minimum 15 credits must be selected from Group A2, the specialist option unit group of the electrical and electronic engineering pathway **and** a minimum of 15 credits from Group B broadening studies. The remaining credits may be taken from units listed in Group A2 and/or Group B and /or Group C (a maximum of 30 credits can be selected from Group C). A total of 60 credits must be at level 6.

Learners must select one of the Level 5 mathematics units from Group C, if they have not already successfully completed the following Higher National units, either J/601/1465 Further Analytical Methods for Engineers or K/601/1412 Advanced Mathematics for Engineering or an equivalent mathematics unit at Level 5.

A maximum of 30 credits can be centre devised at level 5 or above or imported from other QCF Edexcel units at level 5 or above to meet local needs. It is recommended that learners do not select any of the listed level 5 units if they have already achieved these units as part of their Edexcel BTEC Level 4 HNC Diploma or Edexcel BTEC Level 5 HND Diploma in Electrical and Electronic Engineering programme. This is because the units chosen should reflect 'further learning' after completion of a Higher National Diploma programme.

| Group A1 (30 credits must be taken from this group.) | | | | | |
|---|------------|--|--------------|---------------|------------|
| Unit | URN | Mandatory core unit | Level | Credit | GLH |
| T1 | Y/503/7221 | Major Project | 6 | 30 | 120 |
| Group A2 electrical and electronic engineering option units (a minimum of 15 credits must be taken from this group). | | | | | |
| Unit | URN | Option units | Level | Credit | GLH |
| T2 | D/503/7222 | Power Electronics and Drives | 6 | 15 | 60 |
| T6 | A/503/7342 | Data Communication and Sensor Networks | 6 | 15 | 60 |
| T7 | F/503/7343 | Modelling and Simulation for Engineers | 6 | 15 | 60 |
| T8 | R/503/7380 | Digital Signal Processing | 6 | 15 | 60 |
| T9 | Y/503/7381 | Control Engineering Design | 6 | 15 | 60 |
| T10 | A/503/8619 | Embedded Systems in Engineering | 6 | 15 | 60 |
| T11 | H/503/7383 | Sustainability in Engineering | 6 | 15 | 60 |
| T12 | K/503/7384 | Digital Communications in Engineering | 6 | 15 | 60 |

Group B broadening studies option units (a minimum of 15 credits must be taken from this group.)

| Unit | URN | Option units | Level | Credit | GLH |
|------|------------|---|-------|--------|-----|
| BR1 | M/503/7385 | Financial Principles and Techniques for Non-specialists | 6 | 15 | 60 |
| BR2 | T/503/7386 | Strategic Management | 6 | 15 | 60 |
| BR3 | K/503/7269 | Innovation and Creativity in Business | 6 | 15 | 60 |
| BR4 | D/503/7270 | Supply Chain Management | 6 | 15 | 60 |
| BR5 | H/503/7271 | Management and Leadership | 6 | 15 | 60 |
| BR6 | K/503/7272 | Entrepreneurship in Business | 6 | 15 | 60 |
| BR7 | M/503/7273 | Change Management | 6 | 15 | 60 |
| BR8 | A/503/7387 | Applying Lean Principles to Business Operations | 6 | 15 | 60 |
| BR9 | F/503/7388 | Contemporary Issues in Business | 6 | 15 | 60 |
| BR10 | T/503/7274 | Project Management for Engineering | 6 | 15 | 60 |

Group C option units (a maximum of 30 credits can be taken from these units from the Edexcel BTEC Level 5 HND Diploma in Electrical and Electronic Engineering.)

| Unit | URN | Option units | Level | Credit | GLH |
|-------|------------|--|-------|--------|-----|
| HN17 | Y/601/1535 | Business Improvement Techniques | 5 | 15 | 60 |
| HN26 | A/601/0992 | Employability Skills | 5 | 15 | 60 |
| HN27 | T/601/0943 | Personal and Professional Development | 5 | 15 | 60 |
| HN29 | D/601/0998 | Work-based Experience | 5 | 15 | 60 |
| HN35 | J/601/1465 | Further Analytical Methods for Engineers | 5 | 15 | 60 |
| HN59 | K/601/1412 | Advanced Mathematics for Engineering | 5 | 15 | 60 |
| HN31 | A/601/1477 | Value Management | 5 | 15 | 60 |
| HN38 | M/601/1458 | Managing People in Engineering | 5 | 15 | 60 |
| HN67 | K/601/1393 | Further Electrical Power | 5 | 15 | 60 |
| HN116 | A/602/2236 | Further Electrical Principles | 5 | 15 | 60 |

Edexcel BTEC Level 6 Extended Diploma in Engineering (Electrical and Electronic Engineering) (QCF)

The Edexcel BTEC Level 6 Extended Diploma in Engineering (Electrical and Electronic Engineering) consists of a total of 120 credits, made up of level 6 units only. It includes one mandatory core unit entitled *Major Project* (30 credits) from Group A. A further minimum 30 credits must be selected from Group B1, the specialist option unit group of the electrical and electronic engineering pathway **and** a minimum of 30 credits from Group B2 broadening studies option units. The remaining 30 level 6 credits can be either centre devised units and/or chosen from Group B1/ B2 or imported from other QCF Edexcel units at level 6 or above.

It is a pre-requisite requirement for entry onto the Extended Diploma that learners have successfully completed the following Higher National units, either J/601/1465 Further Analytical Methods for Engineers or K/601/1412 Advanced Mathematics for Engineering or an equivalent mathematics unit at Level 5.

| Group A (30 credits must be taken from this group.) | | | | | |
|---|------------|--|--------------|---------------|------------|
| Unit | URN | Mandatory core unit | Level | Credit | GLH |
| T1 | Y/503/7221 | Major Project | 6 | 30 | 120 |
| Group B1 electrical and electronic engineering option units (a minimum of 30 credits must be taken from this group.) | | | | | |
| Unit | URN | Option units | Level | Credit | GLH |
| T2 | D/503/7222 | Power Electronics and Drives | 6 | 15 | 60 |
| T6 | A/503/7342 | Data Communication and Sensor Networks | 6 | 15 | 60 |
| T7 | F/503/7343 | Modelling and Simulation for Engineers | 6 | 15 | 60 |
| T8 | R/503/7380 | Digital Signal Processing | 6 | 15 | 60 |
| T9 | Y/503/7381 | Control Engineering Design | 6 | 15 | 60 |
| T10 | A/503/8619 | Embedded Systems in Engineering | 6 | 15 | 60 |
| T11 | H/503/7383 | Sustainability in Engineering | 6 | 15 | 60 |
| T12 | K/503/7384 | Digital Communications in Engineering | 6 | 15 | 60 |

Group B2 broadening studies option units (a minimum of 30 credits must be taken from this group.)

| Unit | URN | Optional units | Level | Credit | GLH |
|-------------|------------|---|--------------|---------------|------------|
| BR1 | M/503/7385 | Financial Principles and Techniques for Non-specialists | 6 | 15 | 60 |
| BR2 | T/503/7386 | Strategic Management | 6 | 15 | 60 |
| BR3 | K/503/7269 | Innovation and Creativity in Business | 6 | 15 | 60 |
| BR4 | D/503/7270 | Supply Chain Management | 6 | 15 | 60 |
| BR5 | H/503/7271 | Management and Leadership | 6 | 15 | 60 |
| BR6 | K/503/7272 | Entrepreneurship in Business | 6 | 15 | 60 |
| BR7 | M/503/7273 | Change Management | 6 | 15 | 60 |
| BR8 | A/503/7387 | Applying Lean Principles to Business Operations | 6 | 15 | 60 |
| BR9 | F/503/7388 | Contemporary Issues in Business | 6 | 15 | 60 |
| BR10 | T/503/7274 | Project Management for Engineering | 6 | 15 | 60 |

Edexcel BTEC Level 6 Subsidiary Diploma in Engineering (Manufacturing Engineering) (QCF)

The Edexcel BTEC Level 6 Subsidiary Diploma in Engineering (Manufacturing Engineering) (QCF) consists of a total of 60 Level 6 credits. A minimum of 15 credits must be taken from Group A option units for the manufacturing specialist pathway and a minimum of 15 credits from Group B broadening studies option units. It is a pre-requisite requirement for entry onto the Subsidiary Diploma that learners have successfully completed the following Higher National units: either J/601/1465 Further Analytical Methods for Engineers or K/601/1412 Advanced Mathematics for Engineering or an equivalent mathematics unit at Level 5.

| Group A manufacturing engineering option units (a minimum of 15 credits must be taken from this group.) | | | | | |
|--|------------|--|--------------|---------------|------------|
| Unit | URN | Option units | Level | Credit | GLH |
| T3 | A/503/7339 | Microelectronics | 6 | 15 | 60 |
| T5 | T/503/7341 | Advanced Manufacturing Processes | 6 | 15 | 60 |
| T7 | F/503/7343 | Modelling and Simulation for Engineers | 6 | 15 | 60 |
| T9 | Y/503/7381 | Control Engineering Design | 6 | 15 | 60 |
| T11 | H/503/7383 | Sustainability in Engineering | 6 | 15 | 60 |
| T14 | L/503/7412 | Advanced Materials | 6 | 15 | 60 |
| T15 | R/503/7413 | Rapid Prototyping Technologies | 6 | 15 | 60 |
| T16 | Y/503/7414 | Quality Management in Engineering | 6 | 15 | 60 |
| T17 | H/503/7416 | Robotic Systems in Engineering | 6 | 15 | 60 |

Group B broadening studies option units (a minimum of 15 credits must be taken from this group.)

| Unit | URN | Option units | Level | Credit | GLH |
|-------------|------------|---|--------------|---------------|------------|
| BR1 | M/503/7385 | Financial Principles and Techniques for Non-specialists | 6 | 15 | 60 |
| BR2 | T/503/7386 | Strategic Management | 6 | 15 | 60 |
| BR3 | K/503/7269 | Innovation and Creativity in Business | 6 | 15 | 60 |
| BR4 | D/503/7270 | Supply Chain Management | 6 | 15 | 60 |
| BR5 | H/503/7271 | Management and Leadership | 6 | 15 | 60 |
| BR6 | K/503/7272 | Entrepreneurship in Business | 6 | 15 | 60 |
| BR7 | M/503/7273 | Change Management | 6 | 15 | 60 |
| BR8 | A/503/7387 | Applying Lean Principles to Business Operations | 6 | 15 | 60 |
| BR9 | F/503/7388 | Contemporary Issues in Business | 6 | 15 | 60 |
| BR10 | T/503/7274 | Project Management for Engineering | 6 | 15 | 60 |

Edexcel BTEC Level 6 Diploma in Engineering (Manufacturing Engineering) (QCF)

The Edexcel BTEC Level 6 Diploma in Engineering (Manufacturing Engineering) consists of a total of 90 credits. It includes one mandatory core level 6 unit entitled *Major Project* (30 credits) from Group A1. A further minimum 15 credits must be selected from Group A2, the specialist option unit group of the manufacturing engineering pathway **and** a minimum of 15 credits from Group B broadening studies option units. The remaining credits may be taken from units listed in Group A2 and/or Group B and/or Group C (a maximum of 30 credits can be selected from Group C). A total of 60 credits must be at level 6.

Learners must select one of the Level 5 mathematics units from Group C, if they have not already successfully completed the following Higher National units, either J/601/1465 Further Analytical Methods for Engineers or K/601/1412 Advanced Mathematics for Engineering or an equivalent mathematics unit at Level 5.

A maximum of 30 credits can be centre devised at level 5 or above or imported from other QCF Edexcel units at level 5 or above to meet local needs. It is recommended that learners do not select any of the listed level 5 units if they have already achieved these units as part of their Edexcel BTEC Level 4 HNC Diploma or Edexcel BTEC Level 5 HND Diploma in Manufacturing Engineering programme. This is because the units chosen should reflect 'further learning' after completion of a Higher National Diploma programme.

| Group A1 (30 credits must be taken from this group.) | | | | | |
|---|------------|--|--------------|---------------|------------|
| Unit | URN | Mandatory core unit | Level | Credit | GLH |
| T1 | Y/503/7221 | Major Project | 6 | 30 | 120 |
| Group A2 manufacturing engineering option units (a minimum of 15 credits must be taken from this group.) | | | | | |
| Unit | URN | Option units | Level | Credit | GLH |
| T3 | A/503/7339 | Microelectronics | 6 | 15 | 60 |
| T5 | T/503/7341 | Advanced Manufacturing Processes | 6 | 15 | 60 |
| T7 | F/503/7343 | Modelling and Simulation for Engineers | 6 | 15 | 60 |
| T9 | Y/503/7381 | Control Engineering Design | 6 | 15 | 60 |
| T11 | H/503/7383 | Sustainability in Engineering | 6 | 15 | 60 |
| T14 | L/503/7412 | Advanced Materials | 6 | 15 | 60 |
| T15 | R/503/7413 | Rapid Prototyping Technologies | 6 | 15 | 60 |
| T16 | Y/503/7414 | Quality Management in Engineering | 6 | 15 | 60 |
| T17 | H/503/7416 | Robotic Systems in Engineering | 6 | 15 | 60 |

Group B broadening studies option units (a minimum of 15 credits must be taken from this group.)

| Unit | URN | Option units | Level | Credit | GLH |
|------|------------|---|-------|--------|-----|
| BR1 | M/503/7385 | Financial Principles and Techniques for Non-specialists | 6 | 15 | 60 |
| BR2 | T/503/7386 | Strategic Management | 6 | 15 | 60 |
| BR3 | K/503/7269 | Innovation and Creativity in Business | 6 | 15 | 60 |
| BR4 | D/503/7270 | Supply Chain Management | 6 | 15 | 60 |
| BR5 | H/503/7271 | Management and Leadership | 6 | 15 | 60 |
| BR6 | K/503/7272 | Entrepreneurship in Business | 6 | 15 | 60 |
| BR7 | M/503/7273 | Change Management | 6 | 15 | 60 |
| BR8 | A/503/7387 | Applying Lean Principles to Business Operations | 6 | 15 | 60 |
| BR9 | F/503/7388 | Contemporary Issues in Business | 6 | 15 | 60 |
| BR10 | T/503/7274 | Project Management for Engineering | 6 | 15 | 60 |

Group C option units (a maximum of 30 credits can be taken from these units from the Edexcel BTEC Level 5 HND Diploma in Manufacturing Engineering.)

| Unit | URN | Option units | Level | Credit | GLH |
|------|------------|--|-------|--------|-----|
| HN17 | Y/601/1535 | Business Improvement Techniques | 5 | 15 | 60 |
| HN26 | A/601/0992 | Employability Skills | 5 | 15 | 60 |
| HN27 | T/601/0943 | Personal and Professional Development | 5 | 15 | 60 |
| HN29 | D/601/0998 | Work-based Experience | 5 | 15 | 60 |
| HN31 | A/601/1477 | Value Management | 5 | 15 | 60 |
| HN35 | J/601/1465 | Further Analytical Methods for Engineers | 5 | 15 | 60 |
| HN38 | M/601/1458 | Managing People in Engineering | 5 | 15 | 60 |
| HN59 | K/601/1412 | Advanced Mathematics for Engineering | 5 | 15 | 60 |

Edexcel BTEC Level 6 Extended Diploma in Engineering (Manufacturing Engineering) (QCF)

The Edexcel BTEC Level 6 Extended Diploma in Engineering (Manufacturing Engineering) consists of a total of 120 credits, made up of level 6 units only. It includes one mandatory core unit entitled *Major Project* (30 credits) from Group A. A further minimum 30 credits must be selected from Group B1, the specialist option unit group of the manufacturing engineering pathway **and** a minimum of 30 credits from Group B2 broadening studies option units. The remaining 30 level 6 credits can be either centre devised units and/or chosen from Group B1/ B2 or imported from other QCF Edexcel units at level 6 or above.

It is a pre-requisite requirement for entry onto the Extended Diploma that learners have successfully completed the following Higher National units, either J/601/1465 Further Analytical Methods for Engineers or K/601/1412 Advanced Mathematics for Engineering or an equivalent mathematics unit at Level 5.

| Group A (30 credits must be taken from this group.) | | | | | |
|---|------------|--|--------------|---------------|------------|
| Unit | URN | Mandatory core unit | Level | Credit | GLH |
| T1 | Y/503/7221 | Major Project | 6 | 30 | 120 |
| Group B1 manufacturing engineering option units (a minimum of 30 credits must be taken from this group.) | | | | | |
| Unit | URN | Option units | Level | Credit | GLH |
| T3 | A/503/7339 | Microelectronics | 6 | 15 | 60 |
| T5 | T/503/7341 | Advanced Manufacturing Processes | 6 | 15 | 60 |
| T7 | F/503/7343 | Modelling and Simulation for Engineers | 6 | 15 | 60 |
| T9 | Y/503/7381 | Control Engineering Design | 6 | 15 | 60 |
| T11 | H/503/7383 | Sustainability in Engineering | 6 | 15 | 60 |
| T14 | L/503/7412 | Advanced Materials | 6 | 15 | 60 |
| T15 | R/503/7413 | Rapid Prototyping Technologies | 6 | 15 | 60 |
| T16 | Y/503/7414 | Quality Management in Engineering | 6 | 15 | 60 |
| T17 | H/503/7416 | Robotic Systems in Engineering | 6 | 15 | 60 |

Group B2 broadening studies option units (a minimum of 30 credits must be taken from this group.)

| Unit | URN | Option units | Level | Credit | GLH |
|-------------|------------|---|--------------|---------------|------------|
| BR1 | M/503/7385 | Financial Principles and Techniques for Non-specialists | 6 | 15 | 60 |
| BR2 | T/503/7386 | Strategic Management | 6 | 15 | 60 |
| BR3 | K/503/7269 | Innovation and Creativity in Business | 6 | 15 | 60 |
| BR4 | D/503/7270 | Supply Chain Management | 6 | 15 | 60 |
| BR5 | H/503/7271 | Management and Leadership | 6 | 15 | 60 |
| BR6 | K/503/7272 | Entrepreneurship in Business | 6 | 15 | 60 |
| BR7 | M/503/7273 | Change Management | 6 | 15 | 60 |
| BR8 | A/503/7387 | Applying Lean Principles to Business Operations | 6 | 15 | 60 |
| BR9 | F/503/7388 | Contemporary Issues in Business | 6 | 15 | 60 |
| BR10 | T/503/7274 | Project Management for Engineering | 6 | 15 | 60 |

Edexcel BTEC Level 6 Subsidiary Diploma in Engineering (Aeronautical Engineering) (QCF)

The Edexcel BTEC Level 6 Subsidiary Diploma in Engineering (Aeronautical Engineering) (QCF) consists of a total of 60 Level 6 credits. A minimum of 15 credits must be taken from Group A option units for the aeronautical specialist pathway and a minimum of 15 credits from Group B broadening studies option units. It is a pre-requisite requirement for entry onto the Subsidiary Diploma that learners have successfully completed the following Higher National units: either J/601/1465 Further Analytical Methods for Engineers or K/601/1412 Advanced Mathematics for Engineering or an equivalent mathematics unit at Level 5.

| Group A aeronautical engineering option units (a minimum of 15 credits must be taken from this group.) | | | | | |
|---|------------|--|--------------|---------------|------------|
| Unit | URN | Option units | Level | Credit | GLH |
| T5 | T/503/7341 | Advanced Manufacturing Processes | 6 | 15 | 60 |
| T7 | F/503/7343 | Modelling and Simulation for Engineers | 6 | 15 | 60 |
| T9 | Y/503/7381 | Control Engineering Design | 6 | 15 | 60 |
| T11 | H/503/7383 | Sustainability in Engineering | 6 | 15 | 60 |
| T14 | L/503/7412 | Advanced Materials | 6 | 15 | 60 |
| T18 | K/503/9992 | Aircraft Aerodynamics | 6 | 15 | 60 |
| T19 | M/503/9993 | Aircraft Structural Analysis | 6 | 15 | 60 |
| T20 | A/504/0127 | Aircraft Conceptual Design | 6 | 30 | 120 |
| T21 | R/503/9999 | Aircraft Reliability Engineering | 6 | 15 | 60 |
| T22 | R/504/0134 | Avionic Systems Engineering | 6 | 15 | 60 |
| T23 | J/504/0132 | Flight Dynamics | 6 | 15 | 60 |
| T24 | K/504/0205 | Aircraft Gas Turbine Thermo-fluid Dynamics, Design and Performance | 6 | 15 | 60 |
| T25 | T/504/0126 | Aircraft Hydraulic Systems Design and Performance | 6 | 15 | 60 |

Group B broadening studies option units (a minimum of 15 credits must be taken from this group.)

| Unit | URN | Option units | Level | Credit | GLH |
|-------------|------------|---|--------------|---------------|------------|
| BR1 | M/503/7385 | Financial Principles and Techniques for Non-specialists | 6 | 15 | 60 |
| BR2 | T/503/7386 | Strategic Management | 6 | 15 | 60 |
| BR3 | K/503/7269 | Innovation and Creativity in Business | 6 | 15 | 60 |
| BR4 | D/503/7270 | Supply Chain Management | 6 | 15 | 60 |
| BR5 | H/503/7271 | Management and Leadership | 6 | 15 | 60 |
| BR6 | K/503/7272 | Entrepreneurship in Business | 6 | 15 | 60 |
| BR7 | M/503/7273 | Change Management | 6 | 15 | 60 |
| BR8 | A/503/7387 | Applying Lean Principles to Business Operations | 6 | 15 | 60 |
| BR9 | F/503/7388 | Contemporary Issues in Business | 6 | 15 | 60 |
| BR10 | T/503/7274 | Project Management for Engineering | 6 | 15 | 60 |

Edexcel BTEC Level 6 Diploma in Engineering (Aeronautical Engineering) (QCF)

The Edexcel BTEC Level 6 Diploma in Engineering (Aeronautical Engineering) consists of a total of 90 credits. It includes one mandatory core unit entitled *Major Project* (30 credits) from Group A1. A further minimum 15 credits must be selected from Group A2, the specialist option unit group of the aeronautical engineering pathway **and** a minimum of 15 credits from Group B broadening studies option units. The remaining credits may be taken from listed units in Group A2 and/or Group B and/or Group C (a maximum of 30 credits can be selected from Group C). A total of 60 credits must be at level 6.

Learners must select one of the Level 5 mathematics units from Group C, if they have not already successfully completed the following Higher National units, either J/601/1465 Further Analytical Methods for Engineers or K/601/1412 Advanced Mathematics for Engineering or an equivalent mathematics unit at Level 5.

A maximum of 30 credits can be centre devised at level 5 or above or imported from other QCF Edexcel units at level 5 or above to meet local needs. It is recommended that learners do not select any of the listed level 5 units if they have already achieved these units as part of their Edexcel BTEC Level 4 HNC Diploma or Edexcel BTEC Level 5 HND Diploma in Aeronautical Engineering programme. This is because the units chosen should reflect additional 'further learning' after completion of a Higher National Diploma programme.

| Group A1 (30 credits must be taken from this group.) | | | | | |
|--|------------|--|--------------|---------------|------------|
| Unit | URN | Mandatory core unit | Level | Credit | GLH |
| T1 | Y/503/7221 | Major Project | 6 | 30 | 120 |
| Group A2 aeronautical engineering option units (a minimum of 15 credits must be taken from this group.) | | | | | |
| Unit | URN | Option units | Level | Credit | GLH |
| T5 | T/503/7341 | Advanced Manufacturing Processes | 6 | 15 | 60 |
| T7 | F/503/7343 | Modelling and Simulation for Engineers | 6 | 15 | 60 |
| T9 | Y/503/7381 | Control Engineering Design | 6 | 15 | 60 |
| T11 | H/503/7383 | Sustainability in Engineering | 6 | 15 | 60 |
| T14 | L/503/7412 | Advanced Materials | 6 | 15 | 60 |
| T18 | K/503/9992 | Aircraft Aerodynamics | 6 | 15 | 60 |
| T19 | M/503/9993 | Aircraft Structural Analysis | 6 | 15 | 60 |
| T20 | A/504/0127 | Aircraft Conceptual Design | 6 | 30 | 120 |
| T21 | R/503/9999 | Aircraft Reliability Engineering | 6 | 15 | 60 |
| T22 | R/504/0134 | Avionic Systems Engineering | 6 | 15 | 60 |
| T23 | J/504/0132 | Flight Dynamics | 6 | 15 | 60 |

| Unit | URN | Option units | Level | Credit | GLH |
|---|------------|--|-------|--------|-----|
| T24 | K/504/0205 | Aircraft Gas Turbine Thermo-fluid Dynamics, Design and Performance | 6 | 15 | 60 |
| T25 | T/504/0126 | Aircraft Hydraulic Systems Design and Performance | 6 | 15 | 60 |
| Group B broadening studies option units (a minimum of 15 credits must be taken from this group.) | | | | | |
| Unit | URN | Option units | Level | Credit | GLH |
| BR1 | M/503/7385 | Financial Principles and Techniques for Non-specialists | 6 | 15 | 60 |
| BR2 | T/503/7386 | Strategic Management | 6 | 15 | 60 |
| BR3 | K/503/7269 | Innovation and Creativity in Business | 6 | 15 | 60 |
| BR4 | D/503/7270 | Supply Chain Management | 6 | 15 | 60 |
| BR5 | H/503/7271 | Management and Leadership | 6 | 15 | 60 |
| BR6 | K/503/7272 | Entrepreneurship in Business | 6 | 15 | 60 |
| BR7 | M/503/7273 | Change Management | 6 | 15 | 60 |
| BR8 | A/503/7387 | Applying Lean Principles to Business Operations | 6 | 15 | 60 |
| BR9 | F/503/7388 | Contemporary Issues in Business | 6 | 15 | 60 |
| BR10 | T/503/7274 | Project Management for Engineering | 6 | 15 | 60 |

Group C option units (a maximum of 30 credits can be taken from these units from the Edexcel BTEC Level 5 HND Diploma in Aeronautical Engineering.)

| Unit | URN | Option units | Level | Credit | GLH |
|------|------------|---|-------|--------|-----|
| HN26 | A/601/0992 | Employability Skills | 5 | 15 | 60 |
| HN27 | T/601/0943 | Personal and Professional Development | 5 | 15 | 60 |
| HN29 | D/601/0998 | Work-based Experience | 5 | 15 | 60 |
| HN35 | J/601/1465 | Further Analytical Methods for Engineers | 5 | 15 | 60 |
| HN59 | K/601/1412 | Advanced Mathematics for Engineering | 5 | 15 | 60 |
| HN39 | M/601/1458 | Managing People in Engineering | 5 | 15 | 60 |
| HN88 | D/601/7241 | Principles and Applications of Aircraft Fluid Systems | 5 | 15 | 60 |
| HN89 | J/601/7248 | Aircraft Structural Integrity | 5 | 15 | 60 |
| HN91 | F/601/7250 | Integrated Flight Instrument Systems | 5 | 15 | 60 |
| HN92 | J/601/7251 | Gas Turbine Science | 5 | 15 | 60 |

Edexcel BTEC Level 6 Extended Diploma in Engineering (Aeronautical Engineering) (QCF)

The Edexcel BTEC Level 6 Extended Diploma in Engineering (Aeronautical Engineering) consists of a total of 120 credits, made up of level 6 units only. It includes one mandatory core unit entitled *Major Project* (30 credits) from Group A. A further minimum 30 credits must be selected from Group B1, the specialist option unit group of the aeronautical engineering pathway **and** a minimum of 30 credits from Group B2 broadening studies unit group. The remaining 30 level 6 credits can be either centre devised units and/or chosen from Group B1/B2 or imported from other QCF Edexcel units at level 6 or above.

It is a pre-requisite requirement for entry onto the Extended Diploma that learners have successfully completed the following Higher National units, either J/601/1465 Further Analytical Methods for Engineers or K/601/1412 Advanced Mathematics for Engineering or an equivalent mathematics unit at Level 5.

| Group A (30 credits must be taken from this group.) | | | | | |
|--|------------|--|--------------|---------------|------------|
| Unit | URN | Mandatory core unit | Level | Credit | GLH |
| T1 | Y/503/7221 | Major Project | 6 | 30 | 120 |
| Group B1 aeronautical engineering option units (a minimum of 30 credits must be taken from this group.) | | | | | |
| Unit | URN | Option units | Level | Credit | GLH |
| T5 | T/503/7341 | Advanced Manufacturing Processes | 6 | 15 | 60 |
| T7 | F/503/7343 | Modelling and Simulation for Engineers | 6 | 15 | 60 |
| T9 | Y/503/7381 | Control Engineering Design | 6 | 15 | 60 |
| T11 | H/503/7383 | Sustainability in Engineering | 6 | 15 | 60 |
| T14 | L/503/7412 | Advanced Materials | 6 | 15 | 60 |
| T18 | K/503/9992 | Aircraft Aerodynamics | 6 | 15 | 60 |
| T19 | M/503/9993 | Aircraft Structural Analysis | 6 | 15 | 60 |
| T20 | A/504/0127 | Aircraft Conceptual Design | 6 | 30 | 120 |
| T21 | R/503/9999 | Aircraft Reliability Engineering | 6 | 15 | 60 |
| T22 | R/504/0134 | Avionic Systems Engineering | 6 | 15 | 60 |
| T23 | J/504/0132 | Flight Dynamics | 6 | 15 | 60 |
| T24 | K/504/0205 | Aircraft Gas Turbine Thermo-fluid Dynamics, Design and Performance | 6 | 15 | 60 |
| T25 | T/504/0126 | Aircraft Hydraulic Systems Design and Performance | 6 | 15 | 60 |

Group B2 broadening studies option units (a minimum of 30 credits must be taken from this group.)

| Unit | URN | Option units | Level | Credit | GLH |
|-------------|------------|---|--------------|---------------|------------|
| BR1 | M/503/7385 | Financial Principles and Techniques for Non-specialists | 6 | 15 | 60 |
| BR2 | T/503/7386 | Strategic Management | 6 | 15 | 60 |
| BR3 | K/503/7269 | Innovation and Creativity in Business | 6 | 15 | 60 |
| BR4 | D/503/7270 | Supply Chain Management | 6 | 15 | 60 |
| BR5 | H/503/7271 | Management and Leadership | 6 | 15 | 60 |
| BR6 | K/503/7272 | Entrepreneurship in Business | 6 | 15 | 60 |
| BR7 | M/503/7273 | Change Management | 6 | 15 | 60 |
| BR8 | A/503/7387 | Applying Lean Principles to Business Operations | 6 | 15 | 60 |
| BR9 | F/503/7388 | Contemporary Issues in Business | 6 | 15 | 60 |
| BR10 | T/503/7274 | Project Management for Engineering | 6 | 15 | 60 |

5 Learning and assessment

The purpose of assessment is to ensure that effective learning of the content of each unit has taken place. Evidence of this learning, or the application of the learning, is required for each unit. The assessment of evidence relates directly to the assessment criteria for each unit.

The process of assessment can aid effective learning by seeking and interpreting evidence to decide the stage that learners have reached in their learning, what further learning needs to take place and how best to do this. Therefore, the process of assessment should be part of the effective planning of teaching and learning by providing opportunities for both the learner and assessor to obtain information about progress towards learning goals.

Assessment instruments are constructed within centres. Collectively they should ensure coverage of all assessment criteria within each unit.

It is advised that assessment criteria are indicated clearly on each assessment instrument to provide a focus for learners (for transparency and to ensure that feedback is specific to the criteria) and to assist with internal standardisation processes. Tasks/activities should enable learners to produce evidence that relates directly to the assessment criteria.

When centres are designing assessment instruments, they need to ensure that the instruments are valid, reliable and fit for purpose, building on the application of the assessment criteria. Centres are encouraged to place an emphasis on practical application of the assessment criteria, providing a realistic scenario for learners to adopt, making maximum use of work-related practical experience and reflecting typical practice in the sector concerned. The creation of assessment instruments that are fit for purpose is vital to learner achievement and their importance cannot be over-emphasised.

Assessment and verification roles

There are three key roles involved in implementing assessment processes in a centre, namely:

- quality nominee
- programme leader
- assessor.

The **quality nominee** should ensure the effective management of BTEC programmes and actively encourage and promote good practice. For external examination, they will:

- be the initial point of contact for the Pearson-appointed external examiner
- liaise with appropriate practitioners and internal verifiers, to ensure that the external examiner is able to carry out their role.

The programme leader is responsible for day-to-day management and delivery of the programme. For external examination, they will:

- ensure that records of assessment and samples of learner work are being retained for sampling by the external examiner
- liaise with the Pearson-appointed external examiner to ensure that appropriate sampling takes place.

Assessors make assessment decisions. They are usually the tutors within the centre, but the term 'assessor' refers to the specific responsibility for making sure that assessment is carried out correctly and is consistent with national standards. Assessors may also draft or adapt internal assessment instruments.

You are required to keep records of assessment and have assessment authorised by Pearson. The main records are:

- the overall plan of assessment, showing the timeline for assessment
- assessment instruments
- assessment records, which contain the assessment decisions for each learner for each unit.

Authenticity and authentication

Tutors can accept only evidence for assessment that is authentic, i.e. that is the learner's own and that can be judged fully to see whether it meets the assessment criteria.

Tutors should ensure that authenticity is considered when setting assignments. For example, ensuring that each learner has a different focus for research will reduce opportunities for copying or collaboration. On some occasions it will be useful to include supervised production of evidence. Where appropriate, practical activities or performance observed by the assessor should be included.

Learners must authenticate the evidence that they provide for assessment. They do this by signing a declaration stating that it is their own work when they submit it. For practical or performance tasks observed by the assessor this is not necessary.

Assessors should assess only learner evidence that is authentic. If they find through the assessment process that some or all of the evidence is not authentic, they need to take appropriate action, including invoking malpractice policies as required.

It is important that all evidence can be validated through verification. This means that it must be capable of being reassessed in full by another person. When tutors are using practical and performance evidence they need to think about how supporting evidence can be captured, through using videos, recordings, photographs, handouts, task sheets etc.

The authentication of learner evidence is the responsibility of the centre. If during external sampling a Pearson-appointed external examiner raises concerns about the authenticity of evidence, the centre will be required to investigate further. Depending on the outcomes, penalties may be applied. At the end of this section, there is an example of a template that can be used to record learner declarations in relation to the authenticity of the evidence presented for assessment.

Passing internal assessments

Each unit and learning outcome has specified assessment criteria. Learners must pass each learning outcome in a unit to pass the unit and each unit in the selected rule of combination to pass the qualification.

Late submission

Tutors should encourage learners to understand the importance of deadlines and of handing work in on time. For assessment purposes it is important that learners are assessed fairly and consistently according to the assessment plan the Lead Internal Verifier has authorised. Tutors do not have to accept for assessment work that was not completed by the date in the assessment plan. Learners may be given authorised extensions for legitimate reasons, such as illness, at the time of submission. If tutors accept a late completion, the evidence should be assessed normally, unless it is judged to not meet the requirements for authenticity. It is not appropriate, however, to automatically downgrade assessment decisions as 'punishment' for late submission.

Appeals

The centre must have a policy for dealing with appeals from learners. These appeals may relate to assessment decisions being incorrect or assessment not being conducted fairly. The first step in such a policy would be consideration of the evidence by a Lead Internal Verifier or other member of the programme team. The assessment plan should allow time for potential appeals after assessment decisions have been given to learners.

If there is an appeal by a learner the centre must document the appeal and its resolution.

Dealing with malpractice

The centre must have a policy for dealing with potential malpractice by learners. The policy must follow the *Edexcel Assessment Malpractice policy* (see www.edexcel.com/policies). The centre must report serious malpractice to Pearson, particularly if any units have been subject to quality assurance or certification.

(Exemplar for centres)

Learner Assessment Submission and Declaration

This sheet must be completed by the learner and provided for work submitted for assessment.

| | | | |
|---------------------------------|------------------|----------------|--|
| Learner name: | | Assessor name: | |
| Date issued: | Completion date: | Submitted on: | |
| Qualification: | | | |
| Assessment reference and title: | | | |

Please list the evidence submitted for each task. Indicate the page numbers where the evidence can be found or describe the nature of the evidence (e.g. video, illustration).

| Task ref. | Evidence submitted | Page numbers or description |
|------------------------------------|--------------------|-----------------------------|
| | | |
| | | |
| | | |
| | | |
| Comments for note by the assessor: | | |

Learner declaration

I certify that the work submitted for this assignment is my own. I have referenced any sources used in the work clearly. I understand that false declaration is a form of malpractice.

Learner signature:

Date:

6 Qualification grade

Learners must pass each unit for an eligible combination of units for the qualification to pass the overall qualification (see *Section 4 Qualification structures* for the specified rules of combination for the Edexcel BTEC Level 6 Diplomas in Engineering). For the combination of units to be eligible, the learner must achieve any specified mandatory units and a further number of specified credits from each subsequent group up to the required minimum total of credits for the qualification.

7 Recognition of prior learning

Recognition of Prior Learning (RPL) is a method of assessment (leading to the award of credit) that considers whether a learner can demonstrate that they can meet the assessment requirements for a unit through knowledge, understanding or skills they already possess and that has not been previously certificated.

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

Provided that the assessment requirements of a given unit or qualification have been met, the use of RPL is acceptable for accrediting a unit, units or a whole qualification. Evidence of learning must be valid and reliable.

Full guidance about Pearson's policy on RPL is given on our website (www.edexcel.com/policies).

8 Quality assurance of centres

Pearson's quality assurance system for all BTEC higher level programmes on the QCF at Levels 4-7 will ensure that centres have effective quality assurance processes to review programme delivery. It will also ensure that the outcomes of assessment are to national standards.

The quality assurance process for centres offering Pearson BTEC higher level programmes on the QCF at Levels 4-7 comprises three key components.

Approval process

Centres will be required to seek approval to offer BTEC Level 6 Diploma qualifications in Engineering through the existing Edexcel qualification and centre approval process. Prior to approval being given, centres will be required to submit evidence to demonstrate that they:

- have the human and physical resources required for effective delivery and assessment
- understand the implications for independent assessment and agree to abide by these
- have a robust internal assessment system supported by 'fit for purpose' assessment documentation
- have a system to internally verify assessment decisions, to ensure standardised assessment decisions are made across all assessors and sites.

Applications have to be supported by the head of the centre (principal, chief executive etc) and include a declaration that the centre will operate the programmes strictly as approved and in line with Pearson requirements.

Monitoring of internal centre systems

Centres will be required to demonstrate ongoing fulfilment of the centre approval criteria over time and across all programmes. The process that assures this is external examination, which is undertaken by Pearson's appointed External Examiners. Centres will be given the opportunity to present evidence of the ongoing suitability and deployment of their systems to carry out the required functions. This includes the consistent application of policies affecting learner registrations, appeals, effective internal examination and standardisation processes. Where appropriate, centres may present evidence of their operation within a recognised code of practice, such as that of the Quality Assurance Agency for Higher Education. Pearson reserves the right to confirm independently that these arrangements are operating to Pearson's satisfaction.

Pearson will affirm, or not, the ongoing effectiveness of such systems. Where system failures are identified, sanctions (appropriate to the nature of the problem) will be applied in order to assist the centre in correcting the problem.

Independent assessment review

The internal assessment outcomes reached for all Edexcel BTEC higher level programmes on the Qualifications and Credit Framework at Levels 4-7 are subject to an independent assessment review by an Edexcel-appointed External Examiner.

The outcomes of this process will be to:

confirm that internal assessment is to national standards and allow certification

or

make recommendations to improve the quality of assessment outcomes before certification is released

or

make recommendations about the centre's ability to continue to be approved for the qualifications in question.

Additional arrangement for ALL centres

Regardless of the type of centre, Pearson reserves the right to withdraw either qualification or centre approval when it deems there is an irreversible breakdown in the centre's ability either to quality assure its programme delivery or its assessment standards.

9 Programme design and delivery

Centres are reminded that *The Report of the National Committee of Inquiry into Higher Education* (the Dearing Report) recommended that they 'develop, for each programme they offer, a 'programme specification' which identifies potential stopping-off points and gives the intended outcomes of the programme ...'

The Quality Assurance Agency for Higher Education (QAA) has produced guidelines for centres on preparing programme specifications (reference *Guidelines for preparing programme specifications: QAA 115 06/06*) which includes related post-Dearing developments. Annex 2: *Working with programme specifications: a leaflet for further education colleges* of this QAA document contains additional guidance notes to support further education colleges writing programme specifications for Edexcel awards.

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

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

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

Pearson does not define how Edexcel BTEC Level 6 Diploma qualifications should be delivered. Centres are free to offer the qualifications using any mode of delivery that meets the needs of their learners. This may be through traditional classroom teaching, open learning, distance learning or a combination of these. Whatever mode of delivery is used, centres must ensure that learners have appropriate access to the resources identified in the specification and to the subject specialists delivering the units. This is particularly important for learners studying for the qualification through open or distance learning.

Full guidance on our policies on distance assessment and electronic assessment are given on our website: www.edexcel.com/Policies

10 Meeting local needs

Centres should note that the qualifications set out in these specifications have been developed in consultation with centres, employers, the Engineering Council, The Institution of Engineering and Technology, the Institution of Mechanical Engineers and the Royal Aeronautical Society together with support from SEMTA, the Sector Skills Council (SSC) for the engineering sector.

The units are designed to meet the skill needs of the sector and the specialist pathway units allow coverage of the full range of employment within the sector. Centres should make maximum use of the choice available to them within the specialist units, as well as the local skills and training needs identified by organisations such as Regional Development Agencies and local funding agencies.

Centres delivering the Edexcel BTEC Level 6 Diploma and/or Edexcel BTEC Level 6 Extended Diploma in Engineering may not always be able to meet local needs using the units in this specification. In this situation, centres can seek approval from Pearson to use other Edexcel QCF units in these qualifications. Up to a maximum of 30 credits at level 5 or above may be imported into the Edexcel BTEC Level 6 Diploma in Engineering. Up to a maximum of 30 credits of level 6 or above Edexcel QCF units may be imported into the Edexcel BTEC Level 6 Extended Diploma in Engineering. Meeting local needs units cannot be used as substitute units for mandatory units within these qualifications. Centres will have to justify the need for importing meeting local needs units. Pearson will check to see that the vocational focus of the qualification remains the same if these units were introduced.

11 Credit transfer

Learners who have previously achieved level 5 units listed on the rules of combination of Edexcel BTEC Level 6 Diplomas in Engineering can transfer level 5 credit up to a maximum of 30 credits. Prior achievement of these units will be flagged on the learner's ULN. The listed level 5 units can be used towards level 6 qualifications until the time that they are required or withdrawn.

12 Access and recruitment

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

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

Centres are required to recruit with integrity learners to BTEC Level 6 qualifications.

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

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

For learners with disabilities and specific needs, this review will need to take account of the support available to the learner during teaching and assessment of the qualification. The review must take account of the information and guidance in *Section 13 Access to qualifications for learners with disabilities or specific needs*.

13 Access to qualifications for learners with disabilities or specific needs

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

We are committed to making sure that:

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

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

Details on how to make adjustments for learners with protected characteristics are in the policy document *Reasonable Adjustment and Special Considerations for BTEC and Pearson NVQ Qualifications*, which is on our website, www.edexcel.com/Policies/

Special consideration

You must operate special consideration in line with Pearson's Reasonable Adjustments and Special Considerations policy. You can provide special consideration only in the time given for evidence to be provided or for the format of the assessment if it is equally valid. You may not substitute alternative forms of evidence to that required in a unit, or omit the application of any assessment criteria to judge attainment. Pearson can consider applications for special consideration in line with the policy.

14 Unit format

Units have the following sections.

Unit title

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

Unit code

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

QCF level

All units and qualifications within the QCF have a level assigned to them. There are 9 levels of achievement, from Entry to level 8. The QCF Level Descriptors inform the allocation of the level.

Credit value

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

Guided learning hours

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

Unit aim

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

Unit abstract

The unit abstract gives the reader an appreciation of the unit in the vocational setting of the qualification, as well as highlighting the focus of the unit. It gives the reader a snapshot of the unit and the key knowledge, skills and understanding gained while studying the unit. The unit abstract also highlights any links to the appropriate vocational sector by describing how the unit relates to that sector.

Learning outcomes

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

Unit content

The information below shows how unit content is structured and gives the terminology used to explain the different components within the content.

- Learning outcomes: this is given in bold at the beginning of each section of content.
- Italicised sub-heading: it contains a key phrase or concept. This is content which **must** be covered in the delivery of the unit. Colons mark the end of an italicised sub-heading.
- Elements of content: the elements are in roman text and amplify the sub-heading. The elements must also be covered in the delivery of the unit. Semi-colons mark the end of an element.
- Brackets contain amplification of elements of content which must be covered in the delivery of the unit.
- 'eg' is a list of examples used for indicative amplification of an element (that is, the content specified in this amplification that could be covered or that could be replaced by other, similar material).

It is not a requirement of the unit specification that all of the content is assessed.

Assessment criteria

The assessment criteria specify the standard to which a learner must provide evidence in order to achieve the learning outcome.

Guidance

This section provides additional guidance related to the unit to support tutors/deliverers and assessors. Its sub-sections are given below:

- *Links to National Occupational Standards, other BTEC units, other BTEC qualifications and other relevant units and qualifications* – sets out possible links between units within the specification. Provides opportunities for the integration of learning, delivery and assessment. Links to relevant National Occupational Standards and Professional Bodies Standards will be highlighted here.
- *Essential requirements* – essential, unique physical and/or staffing resources or delivery/assessment requirements needed for the delivery of this unit are specified here.
- *Delivery* – this section explains the content's relationship to the learning outcomes and offers guidance on possible approaches to delivery.
- *Assessment* – gives information about the assessment evidence that learners must produce, together with any additional guidance if appropriate. This section should be read in conjunction with the assessment criteria.
- *Resources* – lists resource materials that can be used to support the teaching of the unit, for example books, journals and websites.

15 Further information and useful publications

For further information about the qualifications featured in this specification, or other Pearson qualifications, please call Customer Services on 0844 576 0026 (calls may be monitored for quality and training purposes) or visit our website (www.edexcel.com).

Related information and publications include:

- *Equality Policy*
- *Information Manual* (updated annually)
- *Reasonable Adjustment and Special Considerations for BTEC and Edexcel NVQ Qualifications*
- *Recognition of Prior Learning Policy*
- *Quality Assurance Handbook* (updated annually).
 - Publications on the quality assurance of BTEC qualifications is on our website at www.edexcel.com/quals/BTEC/quality/Pages/documents.aspx
- Our publications catalogue lists all the material available to support our qualifications. To access the catalogue and order publications, please go to www.edexcel.com/resources/publications/home.aspx

Professional body contact details

Engineering Council

246 High Holborn
London WC1V 7EX

Website: www.engc.org.uk

Institution of Engineering and Technology (IET)

Michael Faraday House
Six Hills Way
Stevenage
Hertfordshire
SG1 2SD

+44(0)1438313311

Website: www.theiet.org

Institution of Mechanical Engineers (ImechE)

Bedford Heights
Manton Lane
Bedford
MK41 7PH

+44(0)1234214340

Website: www.idgte.org

Royal Aeronautical Society (RAeS)

4 Hamilton Place

London

W1J 7BQ

+44(0)2076704300

Website: www.aerosociety.com

How to obtain the UK Standard For Professional Competence (UK-Spec)

The UK Standard For Professional Engineering Competence (UK-Spec) can be downloaded from the Engineering Council's website (www.engc.org.uk) or requested from the above address.

How to obtain National Occupational Standards

The National Occupational Standards for Engineering Leadership and Performing Engineering Operations (PEO) can be obtained from:

SEMTA

14 Upton Road

Watford WD18 0JT

Telephone: 01923 238441

Website: www.semta.org.uk

16 Professional development and training

Pearson supports UK and international customers with training related to BTEC qualifications. This support is available through a choice of training options offered in our published training directory or through customised training at your centre.

The support we offer focuses on a range of issues including:

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

The national programme of training we offer is on our website www.edexcel.com/training. You can request customised training through the website or by contacting one of our advisers in the Training from Edexcel team via Customer Services to discuss your training needs.

Our customer service numbers are:

| | |
|-------------------------------|---------------|
| BTEC and NVQ | 0844 576 0026 |
| GCSE | 0844 576 0027 |
| GCE | 0844 576 0025 |
| The Diploma | 0844 576 0028 |
| DiDA and other qualifications | 0844 576 0031 |

Pearson may monitor calls for quality and training purposes.

The training we provide:

- is practical – ideas are developed and applied
- is designed to be supportive and thought provoking
- builds on best practice.

Annexe A

Progression opportunities

These are examples of progression opportunities to other Edexcel qualifications within the engineering sector.

| BTEC vocationally-related qualifications | BTEC Specialist/Professional qualifications | NVQ/competence-based qualifications |
|--|--|-------------------------------------|
| | Edexcel BTEC Level 7 Award, Certificate, Diploma and Extended Diploma in Strategic Management and Leadership. | |
| | Edexcel BTEC Level 6 Subsidiary Diploma, Diploma and Extended Diploma in Mechanical Engineering Edexcel BTEC Level 6 Subsidiary Diploma, Diploma and Extended Diploma in Electrical and Electronic Engineering Edexcel BTEC Level 6 Subsidiary Diploma, Diploma and Extended Diploma in Manufacturing Engineering Edexcel BTEC Level 6 Subsidiary Diploma, Diploma and Extended Diploma in Aeronautical Engineering | |

Annexe B: Mapping of Edexcel BTEC Level 6 Diploma in Engineering units to Engineering Accreditation Board EAB/ACC2 Appendix B: Specified Learning Outcomes for degree programmes leading towards IEng registration

| | | Learning Outcomes for IEng Programmes | | | | | | | | | | | | | | | | | | | | |
|-------|--------------------------------------|---------------------------------------|-----|-----|-----|-----|-----|--------|-----|-----|--|-----|-----|-----|-----|-----|----------------------|-----|-----|-----|-----|-----|
| | | Programme Title | | | | | | | | | Edexcel BTEC Level 6 Diplomas in Engineering | | | | | | | | | | | |
| Level | Ucas code | Engineering Analysis | | | | | | Design | | | Economic, Social, and Environmental Context | | | | | | Engineering Practice | | | | | |
| 6 | Underpinning Science and Mathematics | E1i | E2i | E3i | E4i | D1i | D2i | D3i | D4i | D5i | S1i | S2i | S3i | S4i | S5i | P1i | P2i | P3i | P4i | P5i | P6i | P7i |
| | US1i US2i | x | x | x | x | x | x | x | x | x | x | x | x | x | | x | x | x | x | x | x | x |
| | | x | | x | x | x | x | x | x | x | x | | x | x | x | | | x | x | | | |
| | | x | x | x | x | x | x | x | x | x | x | | x | | | x | x | x | x | | | |
| | | x | x | x | x | x | x | | | | | | | | | | | x | x | x | | |
| | | x | x | x | x | x | x | x | x | | | | | x | | | | | | | | |
| | | x | x | x | x | x | x | x | x | | | | | | | | | | | | | |
| | | x | x | x | x | x | x | x | x | x | x | | | | | | | | | | | |
| | | x | x | x | x | x | x | x | x | x | | | | | | | | | | | | |
| | | x | x | x | x | x | x | Y | | x | | | | | | | | | | | | |

| Module code and title | US1i | US2i | E1i | E2i | E3i | E4i | D1i | D2i | D3i | D4i | D5i | S1i | S2i | S3i | S4i | S5i | P1i | P2i | P3i | P4i | P5i | P6i | P7i |
|--|------|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Control Engineering Design | x | x | | x | x | x | | x | x | | x | | | | | | | | | x | | | |
| Finite Element Analysis | x | x | x | x | x | | x | | | | | | | | | | | x | | | | | |
| Modelling and Simulation for Engineers | x | x | x | x | x | x | x | x | x | | x | | | | | | | | | x | | | |
| Rapid Prototyping Technologies | x | | | x | x | x | x | x | | x | x | | | | x | | | x | x | x | | | x |
| Data Communication and Sensor Networks | x | x | | x | x | x | x | x | x | x | x | x | | | | | | | | x | x | | |
| Robotic Systems in Engineering | x | x | x | x | x | x | x | x | x | x | x | x | | | | | | x | x | x | | | |
| Embedded Systems in Engineering | x | x | | x | x | x | x | x | x | x | x | | | | | | | x | | x | | | |
| Advanced Materials | x | x | x | x | x | x | x | | | | | | | x | | | | | | x | | | x |
| Quality Management in Engineering | x | | x | x | | x | x | x | | | x | x | x | | | | | | | x | | x | x |
| Sustainability in Engineering | | | x | | | | | | x | | | x | | x | x | | | | | | x | x | x |

| Module code and title | US1i | US2i | E1i | E2i | E3i | E4i | D1i | D2i | D3i | D4i | D5i | S1i | S2i | S3i | S4i | S5i | P1i | P2i | P3i | P4i | P5i | P6i | P7i |
|--|------|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Aircraft Dynamics | x | x | x | x | x | x | x | x | | | | | | | | | | | | x | | x | |
| Aircraft Aerodynamics | x | x | x | x | x | | x | x | | | | | | | | | | | x | | | x | |
| Aircraft Conceptual Design | x | x | x | x | x | x | x | x | x | x | | | | | | | | | | x | x | x | |
| Aircraft Reliability Engineering | x | x | x | x | x | x | x | | | | x | | x | | | | | | | x | | x | x |
| Aircraft Structural Analysis | x | x | x | x | x | | x | | | | | | | | x | | | | | | | x | |
| Aircraft Gas Turbine Thermo-fluid Dynamics, Design and Performance | x | x | x | x | x | x | x | x | | | x | | | | | | | x | | | x | | x |
| Aircraft Hydraulic Systems Design and Performance | x | x | x | x | x | x | x | x | | | x | | | | | | | x | | | x | | |
| Financial Principles and Techniques for Non-specialists | | | | | | | | | | | | | x | | | | | | | | | | |
| Strategic Management | | | | | | | | | | | | | x | | | | | | | | | | x |

ANNEXES

| Module code and title | US1i | US2i | E1i | E2i | E3i | E4i | D1i | D2i | D3i | D4i | D5i | S1i | S2i | S3i | S4i | S5i | P1i | P2i | P3i | P4i | P5i | P6i | P7i |
|---|------|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Innovation and Creativity in Business | | | | | | | | | | | | x | x | | | | | | | | | x | |
| Supply Chain Management | | | | | | | | | | | | x | x | x | | | | | | | | x | |
| Management and Leadership | | | | | | | | | | | | | x | | | | | | | | | x | |
| Entrepreneurship in Business | | | | | | | | | | | | x | x | x | x | x | | | | | | x | |
| Change Management | | | | | | | | | | | | x | x | x | x | | | | | | | x | |
| Applying Lean Principles to Business Operations | | | | | | | | | | | | | x | | | | | | | | | x | |
| Contemporary Issues in Business | | | | | | | | | | | | | x | | x | x | | | | | | x | |
| Project Management for Engineering | | | | | | | | | | | | x | x | | x | x | | | | | x | | |

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