

# **Edexcel Level 3 BTEC National Certificate in Manufacturing Engineering**

Findings and actions from the monitoring of  
the qualification



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## **Executive summary**

This report combines the Ofqual scrutiny monitoring findings for the Level 3 BTEC National Certificate in Manufacturing Engineering qualification and the outcomes of the agreed Edexcel action plan implemented in May 2009 and completed in April 2010.

Ofqual found that the assessment for each unit, and for the qualification as a whole, did not include assessment methods that provided opportunities for learners to demonstrate their abilities to meet the full range of requirements. After reviewing the new Qualifications and Credit Framework (QCF) unit specifications we believe that the additional information provided by Edexcel should give centres the necessary information and support to enable learners to demonstrate the full range of their abilities.

We were also concerned about the consistency of internal assessment across centres. In response, Edexcel conducted an audit of the guidance available to centres on internal assessment for all BTEC qualifications. The audit was comprehensive and made a number of recommendations designed to improve the process and quality of internal assessment. Many of these recommendations will be implemented with the introduction of the new QCF BTEC qualifications from September 2010. Ofqual will review these changes through the monitoring of other BTEC qualifications.

From the original sample of work reviewed in October 2008, we found there was little or no evidence of authentication of an individual's contribution to group activities. The lack of annotation on learners' work gave concerns about how internal and external verifiers could review what work had been done and by whom. Further work, supplied as part of the action plan in October 2009, demonstrated that internal and external verification feedback had improved significantly upon the previous year with comprehensive written feedback provided.

Ofqual is satisfied that Edexcel has met the recommendations from the scrutiny. Many of the improvements affect all BTEC qualifications and we will continue to monitor other BTEC qualifications to ensure that they are applied consistently. We identify these under a Future monitoring heading in the appropriate sections.

## **Introduction**

The Office of Qualifications and Examinations Regulation (Ofqual) is the regulator of qualifications, examinations and assessments in England. Its work ensures that children, young people and adult learners get the results their work deserves, that standards are maintained and that the qualifications learners receive count now and in the future.

The Level 3 BTEC National Certificate in Manufacturing Engineering qualification operates within a regulatory framework, which is set out in *The Statutory Regulation of External Qualifications in England, Wales and Northern Ireland* (QCA 2004).

Ofqual carries out a programme of monitoring activities each year to assess the performance of awarding organisations against the regulatory criteria. One of these activities is scrutiny, which is an in-depth study of the assessment process.

The scrutiny of a qualification aims to:

- determine whether the required qualification criteria and regulatory requirements have been met
- determine whether the assessments were fair and effective in measuring achievement by learners in respect of the stated assessment criteria and learning outcomes
- determine whether the procedures designed to ensure consistency of practice and comparability of standards are implemented effectively
- identify any aspects of the specification that appear to have constrained fair, effective and reliable assessment
- identify good practice that is worthy of encouragement and dissemination to promote continuing improvement in the quality of the qualification.

Each scrutiny involves a team of consultants, who are expert in their subject. The team observes meetings held by the awarding organisation, analyses assessment instruments and grading domains, and reviews a sample of learners' work.

Following each scrutiny, Ofqual reports to the awarding organisation, indicating how, if necessary, the awarding organisation should improve its provision. The awarding organisation produces an action plan in response, which details how and when any issues will be addressed.

Ofqual reported initial findings from the scrutiny of the Level 3 BTEC National Certificate in Manufacturing Engineering to Edexcel in April 2009. In May 2009

Edexcel provided an action plan in response to the findings, which we agreed at a meeting with Edexcel in July 2009.

Our findings were based on evidence from the observation of different aspects of the assessment process, consideration of assessment materials (specification, unit specifications, marking criteria and guidance materials issued by the awarding organisations) and learners' work. Due to the nature of the assessment this scrutiny also involved a centre survey and a series of centre visits. Details of the meetings observed are provided in Appendix A.

As part of their action plan Edexcel supplied Ofqual with additional examples of learners' work, details of the newly developed Qualifications and Credit Framework (QCF) units and various reports which demonstrated the steps Edexcel had taken to address the issues highlighted in the findings report. These steps are evaluated in this report under the sections entitled Action taken.

## **Monitoring of the Level 3 BTEC National Certificate in Manufacturing Engineering**

The Level 3 BTEC National Certificate in Manufacturing Engineering specification defines the BTEC qualification as ‘qualifications that are designed to provide specialist work-related qualifications in a range of sectors. They give learners the knowledge, understanding and skills that they need to prepare them for employment. The qualifications also provide career development opportunities for those already in work. Consequently they can provide a course of study for full-time or part-time learners in schools, colleges and training centres.

The family of BTEC Nationals includes Awards, Certificates and Diplomas which offer opportunities for nested provision and flexibility of delivery.

BTEC Nationals are designed to relate to the National Occupational Standards for the sector, where these are appropriate, and are supported by the relevant Standards Setting Body (SSB) or Sector Skills Council (SSC). Some BTEC Nationals form the Technical Certificate component of Apprenticeships and all attract UCAS points that equate to similar-sized general qualifications.

On successful completion of a BTEC National qualification, learners can progress into or within employment and/or continue their study in the same vocational area.’

### **Scheme of assessment**

The Level 3 BTEC National Certificate in Manufacturing Engineering was accredited for first teaching in September 2007. The full specification for the manufacturing engineering suite of qualifications comprises 37 units, which are all internally assessed and externally verified. A summary of the scheme of assessment is provided in Appendix B.

The specification provides detailed learning outcomes and guidance on task setting for both learners and assessors. This information allows centres to tailor tasks and assignments and provides them with opportunities to personalise learning and make the tasks relevant to a sector or local needs.

For the purposes of the scrutiny the consideration of assessment materials covered Units 1 to 8, 10, 16 and 17, while consideration of learners’ work focused on Units 1, 2, 4, 5, 7, 10 and 19.

## **Validity of assessment**

Although there is evidence of parity of demand across most of the units considered, there were some exceptions.

We found that, while the grading grids for each unit used criteria in a consistent way, the individual statements within the criteria did not always promote the depth of subject knowledge required to achieve work of a Level 3 standard. For example, the criteria for Unit 1 were clear and explicit but opportunities were limited for more able learners to demonstrate their abilities. There was no coherent progression from pass to merit and merit to distinction, which increases potential for inconsistencies in assessment.

The criteria for merit and distinction did not focus on engineering content or product, and more emphasis was placed on skills such as evaluation and analysis. There was no opportunity for learners to demonstrate engineering flair, design ability or product quality. For example, for all units considered, including Unit 3 (Engineering Project), there was no reward given for the quality of the final outcome at merit and distinction grades.

There were also discrepancies between the command words used to illustrate the progressive quality of response required at each grade and those appearing in the actual grading criteria. For example, 'demonstrate' and 'evaluate' appear in Edexcel's Study Guide list of common command words, for merit and distinction respectively, but demonstrate does not appear in the merit grading criteria and evaluate often does (Units 2, 5 and 19). Such discrepancies are likely to present difficulties when trying to accurately reward higher ability learners for what they know, understand and can do across a range of different units.

In the initial findings Ofqual informed Edexcel that the assessment and content for each unit, and for the qualification as a whole, must include assessment methods that provide opportunities for learners to demonstrate their abilities to meet the full range of requirements.

## **Action taken**

In October 2009 Edexcel submitted draft units for the revised QCF qualification as evidence of the improvements made. Ofqual reviewed: Unit 2 (Communication for Technicians); Unit 6 (Mechanical Principles and Applications); and Unit 23 (Applications of Welding Technology). We found that the updated assessment and grading grids provided a clearer structure to the units and demonstrated what is required for learners to achieve a pass, merit or a distinction. We believe that the new QCF unit specifications should provide centres with a very clear understanding of the expected learning outcomes, which should encourage a more standardised approach across centres.

After reviewing the new QCF unit specifications we are confident that the additional information provided by Edexcel will give centres the necessary information and support to enable learners to demonstrate the full range of their abilities.

### **Future monitoring**

We will continue to monitor the issues raised in this section to ensure that the improvements made for this qualification are applied to other BTEC qualifications.

## **Quality and authentication of learner work**

From a review of learners' work it was evident that learners had not always followed the assignment instructions where they were required to produce a report or description of the experiment or investigation they had carried out. This resulted in learners' work containing uncoordinated sheets of data, test results and diagrams with no evidence of how they had been obtained.

The original sample of learners' work in October 2008 had little or no evidence of authentication of an individual's contribution to group activities. In one centre, two learners had produced identical work without any acknowledgement from the assessor that it was clearly duplicated. This lack of authentication meant that the majority of learners' work was not considered to be of the required quality.

The lack of annotation on learners' work gave concerns about how internal and external verifiers could review what work had been done and by whom.

### **Action taken**

Our initial report stated that Edexcel must take steps to ensure that the evidence provided by learners is relevant and authentic, and sufficient to determine whether the candidates meet the required standards. Edexcel is conducting a review of guidance available for centres on the authenticity of learners' work in 2010.

An additional sample of learners' work was supplied in response to the action plan agreed in July 2009. The sample did include certificates of authentication signed by the learners, the assessors and the internal verifiers, and the authentication sheet specified the assessment criteria covered by the assignment, making it clear that the learners had met the requirements. This was an improvement on the original sample of work received and demonstrates that improvements have already been made by some centres.

Internal and external verification feedback had improved significantly upon the previous year, with comprehensive written feedback provided.



## **The assessment process**

### **Centre risk assessment**

Edexcel developed a process of centre risk assessment (CRA) to monitor the effectiveness of quality controls in centres and to manage risks. The aim of this process is to improve the quality of the delivery and management of all BTEC programmes.

The CRA process involves a team of personnel from the awarding organisation – including a quality manager, risk assessor and a quality standards team – working with a team from the centre, which would include a quality nominee, programme managers and assessors. Each centre with registered learners is visited by Edexcel once every four years, and for the other three years the centre undertakes self-assessment online.

Centres are reviewed against 15 risk areas to ensure that their provision for BTEC qualifications is fit for purpose. The centre risk assessor reviews two programme areas within each centre.

Where risks are identified the centre is given a three-month action plan, which it must adhere to. If the plan is not followed the centre is referred to the regional quality manager. Any centre identified as high risk will receive extra support from the regional quality manager to ensure that appropriate action is taken.

Edexcel has a significant number of support documents relating to CRA, which was felt to be excessive by some centres.

### **Action taken**

Edexcel has created BTEC web pages, giving a view of each process and providing links to the specific documentation available.

### **Verification process**

The Level 3 BTEC National Certificate in Manufacturing Engineering enables centres to select scenarios that compliment their strengths or that link with local industry. These scenarios are then reviewed through an internal and external verification process to ensure that the assignments meet the required national standard.

There was some evidence of good work at Level 3, where learners had produced structured material with good engineering details that had been correctly taught, assessed and quality assured. However, we also found inconsistencies in how assessors and internal and external verifiers were using the guidance and grading grids provided by Edexcel. The standard of learners' work at the pass grade varied

considerably both within and between centres, ranging from work at the appropriate standard to work that failed to meet the pass criteria. There was also a marked variation in centres' interpretation of delivery and assessment, particularly at merit and distinction grades, which has serious implications for the maintenance of a Level 3 standard.

### **Action taken**

In response to these findings, in September 2009 Edexcel conducted an audit of the guidance available to centres on internal assessment, for all BTEC qualifications. Findings from this review included: an analysis of current guidance; information on how internal assessment is checked using national standards sampling; the process for reviewing and monitoring the work of external verifiers; and the CRA process. We consider this audit was comprehensive and made a number of valid recommendations for Edexcel to improve the process and quality of internal assessment.

Edexcel has provided a report on BTEC qualifications as part of its self-assessment return, which is based on Section 6 of the report, Awarding Body Self-Assessment: Guidance for Evaluating and Improving Performance (QCA/06/2448). This report provides a comprehensive range of evidence which demonstrates the rigour of BTEC assessment and also details the revised quality assurance processes for the QCF units that have been trialled with the new WorkSkills qualification.

Edexcel is introducing an amended quality assurance model from September 2010, which will ensure that all centres have regular visits. This model will replace some aspects of sampling that are currently conducted by post. The current postal sampling model is limited, as the centre chooses the sample of work and the external verifier cannot review the previous years' work. The new system will enable on-site review of processes to ensure that they are effective rather than relying on the centre to post materials. The new system will also ensure that postal verification includes whole unit and the capacity to review archived work from the previous year.

### **Future monitoring**

The revised quality assurance processes should address many of the concerns raised by the centres in the scrutiny. Ofqual currently has no plans to continue monitoring this specification but we will review the impact of these changes through the monitoring of other BTEC qualifications.

## **Support and guidance**

As part of the scrutiny in 2008, all centres with learners registered for the specification were invited to contribute their views on the following areas: the approval process, support provided by the awarding organisation, setting assignments and assessing candidate work, the verification process, centre risk assessment and internal standardisation. Forty-seven of the centres who participated in this exercise completed a postal questionnaire, and of these 21 responded. Six different centres were invited to attend interviews with Ofqual staff and consultants.

Centres reported that the support material provided by Edexcel links well with the assignment, task requirements and assessment criteria. There is a wide range of clear guidance that refers to teaching and delivery strategies. However, centres did report that the volume of documents that they were required to read was excessive.

Although centres felt that Edexcel generally provided a good level of support they reported that there were:

- limited opportunities for personal contact with the awarding organisation
- inconsistencies in the way problems were handled.

Centres also requested:

- more support from BTEC representatives for the centre approval process
- that external verification should take place by visit rather than by postal sampling
- clearer lines of communication and feedback, other than through national standards sampling
- regular visits by regional managers.

### **Action taken**

Edexcel has increased the number of regional quality managers to support centres further. One of the main issues has been to identify the correct contact within centres. Normally information is cascaded through the quality nominee at the centre although this process is variable in its effectiveness. Regional quality managers are now making direct contact with programme teams to ensure effective communication regarding specific BTEC qualifications.

Edexcel has also responded to feedback from centres by developing a new quality model for September 2010. This model builds on their experience of CRA, which has been extended and re-titled as 'quality review and development', and external verification, which is being refocused as 'standards verification' to ensure that the central role of standards is emphasised.

### **Future monitoring**

The impact of these changes will not be apparent immediately, and we will review them through the monitoring of other BTEC qualifications.

## **Appendix A: List of observed Edexcel meetings**

<b>Meeting</b>	<b>Date</b>
Lead External Verifier Conference	17/05/2008
Customised centre training visit	12/06/2008
New External Verifier Training	18/07/2008
Existing External Verifier Training	19/07/2008
External Verifier Standardisation	30/08/2008
Internal Verification – Implementation and Delivery of Edexcel Level 2 BTEC Firsts and Level 3 BTEC Nationals	10/12/2008

## **Appendix B: Schemes of assessment**

The Level 3 BTEC National Certificate in Manufacturing Engineering consists of five core units and six specialist units. Learners must take all of the units in the mandatory core plus one core unit from a choice of two. The core unit not chosen can be taken as a specialist unit. (An asterisk indicates the units sampled as part of the monitoring)

<b>Mandatory core units</b>	
1*	Business Systems for Technicians
2*	Communication for Technicians
3*	Engineering Project
4*	Mathematics for Technicians
<b>Core unit choice</b>	
5*	Electrical and Electronic Principles
6*	Mechanical Principles and Applications

The remaining specialist units are split into two groups, A and B. A minimum of four specialist units must be chosen from group A, and the remaining two specialist units can be selected from either group.

<b>Group A units</b>	
7*	Health, Safety, Risk Assessment and Welfare in the Engineering Workplace
8*	Engineering Design
9	Commercial Aspects of Organisations Employing Engineers
10*	Properties and Applications of Engineering Materials
16*	Engineering Drawing for Technicians
17*	Computer-aided Drafting
20	Engineering Primary Forming Processes
21	Engineering Secondary/Finishing Processes
22	Fabrication Processes and Technology

<b>Group A units continued</b>	
23	Applications of Welding Technology
26	Computer Numerical Control of Machine Tools
29	Manufacturing Planning
30	Setting and Proving Secondary Processing Machines
31	Computer-aided Manufacturing
32	Production System Design
33	Six Sigma Quality
36	Mechanical and Thermal Treatment of Metals
37	Structure and Properties of Metals
38	Industrial Alloys
39	Metallurgical Techniques

<b>Group B units</b>	
15	Electro, Pneumatic and Hydraulic Systems and Devices
19*	Mechanical Measurement and Inspection Techniques
25	Selection and Applications of Programmable Logic Controllers
27	Welding Principles
28	Further Mathematics for Technicians
34	Electronic Circuit Manufacture
35	Principles and Applications of Electronic Devices and Circuits
40	Extraction and Refining of Metals
41	Liquid Metal Processing
42	Quality and Business Improvement
43	Teamwork in a Continuous Improvement Environment

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