

Higher National Unit Specification

General information for centres

Unit title: Quality in Construction

Unit code: DW4G 34

Unit purpose: This Unit is designed to provide an understanding of the terms and definitions commonly used in respect of quality, and to develop quality improvement techniques in construction processes.

On completion of the Unit the candidate should be able to:

- 1 Explain key concepts used in the **measurement and improvement** of quality in construction organisations
- 2 Explain the strategy of **lean** production.
- 3 Use quality **improvement techniques**.

Credit points and level: 1 HN Credit at SCQF level 7: (8 SCQF credit points at SCQF level 7*).

**SCQF credit points are used to allocate credit to qualifications in the Scottish Credit and Qualifications Framework (SCQF). Each qualification in the Framework is allocated a number of SCQF credit points at an SCQF level. There are 12 SCQF levels, ranging from Access 1 to Doctorates.*

Recommended prior knowledge and skills: It would be advantageous for candidates to have knowledge and understanding of basic mathematical concepts, particularly statistics, and knowledge of construction processes and products.

Core Skills: There are opportunities to develop the Core Skill(s) of Numeracy, IT, Problem Solving, in this Unit, although there is no automatic certification of Core Skills or Core Skills components.

Context for delivery: If this Unit is delivered as part of a Group Award, it is recommended that it should be taught and assessed within the subject area of the Group Award to which it contributes.

Assessment: The assessment for all outcomes should be combined into one paper. The assessment paper should be composed of short answer, restricted response questions covering outcomes one and two, and a scenario with data, requiring the candidate to analyse and evaluate quality achieved. The assessment paper should be taken by candidates under open book, supervised, controlled conditions and should last two hours.

An exemplar instrument of assessment and marking guidelines have been produced to provide an example of the type of evidence required to demonstrate achievement of the aims of this Unit and to indicate the national standard of achievement at SCQF level 7.

General information for centres (cont)

Where evidence for Outcomes is assessed on a sample basis, the whole of the content listed in the knowledge and/or skills section must be taught and available for assessment. Candidates should not know in advance the items on which they will be assessed and different items should be sampled on each assessment occasion.

Higher National Unit specification: statement of standards

Unit title: Quality in Construction

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The sections of the Unit stating the Outcomes, knowledge and/or skills, and evidence requirements are mandatory.

Where evidence for Outcomes is assessed on a sample basis, the whole of the content listed in the knowledge and/or skills section must be taught and available for assessment. Candidates should not know in advance the items on which they will be assessed and different items should be sampled on each assessment occasion.

Throughout the unit emphasis will be placed where appropriate on the application of Health & Safety and Sustainability. Safe working practises should be looked at in accordance with current safety codes of practise and regulations. Sustainability should include reference to criteria affecting sustainability, impact of not implementing sustainability on the environment and the legislation promoting sustainability.

Outcome 1

Explain key concepts used in the **measurement and improvement** of quality in construction organisations

Knowledge and/or skills

- ◆ Quality Assurance
- ◆ Quality Control
- ◆ Total Quality Management
- ◆ Benchmarking
- ◆ Key performance indicators

Evidence Requirements

Candidates will need to provide evidence to demonstrate their knowledge and/or skills by showing that they can:

- ◆ state the key concepts used to describe, measure and improve quality in construction organisations
- ◆ explain the key concepts used in the assessment of quality in construction operations

Evidence for the knowledge and/or skills for this Outcome will be provided on a sample basis. In any assessment of this outcome a minimum of **three out of five** knowledge and/or skills items should be sampled. In order to ensure that candidates will not be able to foresee what items they will be questioned on, a different sample of knowledge/skills items is required each time the Outcome is assessed. Candidates must provide a satisfactory response to all three items.

Higher National Unit specification: statement of standards (cont)

Unit title: Quality in Construction

Assessment guidelines

Evidence for the knowledge and skills in this Outcome will be generated by the holistic supervised single assessment. For this Outcome, 50 minutes of the two hour assessment is required.

Questions used to elicit candidate evidence may take the form of an appropriate balance of short answer, restricted response and structured questions. The assessment for this outcome should be combined with Outcomes 2 and 3 to form a single assessment paper.

Outcome 2

Explain the strategy of **lean** production

Knowledge and/or skills

- ◆ Just-in-time
- ◆ Automation
- ◆ Flexible working
- ◆ Creative thinking
- ◆ Five lean principles

Evidence Requirements

Candidates will need evidence to demonstrate their skills and/or knowledge by showing that they can:

- ◆ explain key concepts relating to lean production
- ◆ list the advantages of lean production for the benefit of quality in construction

Evidence for the knowledge and/or skills for this outcome will be provided on a sample basis. In any assessment of this outcome a minimum of **three out of five** knowledge and/or skills items should be sampled. In order to ensure that candidates will not be able to foresee what items they will be questioned on, a different sample of knowledge/skills items is required each time the Outcome is assessed. Candidates must provide a satisfactory response to all three items.

Assessment guidelines

Evidence for the knowledge and skills in this Outcome will be generated by the holistic supervised single assessment. For this Outcome, 30 minutes of the two hour assessment is required.

Questions used to elicit candidate evidence may take the form of an appropriate balance of short answer, restricted response and structured questions. The assessment for this outcome could be combined with Outcomes 1 and 3 to form a single assessment paper.

Outcome 3

Use quality **improvement techniques**

Higher National Unit specification: statement of standards (cont)

Unit title: Quality in Construction

Knowledge and/or skills

- ◆ The seven 'old' tools of quality
- ◆ The seven 'new' tools of quality
- ◆ Statistical process control
- ◆ Standard distribution
- ◆ Standard deviation

Evidence Requirements

Candidates will need evidence to demonstrate their skills and/or knowledge by showing that they can:

- ◆ use and describe statistical tools in the measurement of quality
- ◆ apply statistical process control techniques

Evidence for the knowledge and/ or skills in this Outcome will be provided on a sample basis. The evidence may be presented in response to specific questions. Each candidate will need to demonstrate that she/ he can answer correctly questions based on a sample of items shown above. In any of the assessment of this Outcome **three of the five** knowledge and/or skills should be sampled.

In order to ensure that the candidates will not be able to foresee what items they will be questioned on, a different sample of the **three out of the five** knowledge and/or skills in this outcome are assessed. Candidates must provide a satisfactory response to all three items.

Assessment guidelines

Evidence for the knowledge and skills in this Outcome will be generated by the holistic supervised single assessment. For this Outcome, 40 minutes of the two hour assessment is required.

Questions used to elicit candidate evidence may take the form of scenario with data where the candidate is to evaluate the quality of a particular construction process. The assessment for this Outcome could be combined with Outcomes 1 and 2 to form a single assessment paper.

Administrative Information

Unit code:	DW4G 34
Unit title:	Quality in Construction
Superclass category:	VD
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Higher National Unit specification: support notes

Unit title: Quality in Construction

This part of the Unit specification is offered as guidance. The support notes are not mandatory.

While the exact time allocated to this Unit is at the discretion of the centre, the notional design length is 40 hours.

Guidance on the content and context for this Unit

In designing this Unit the unit writers have identified the range of topics that they would expect to be covered by lecturers. The writers have also given recommendations as to how much time should be spent on each outcome. This has been done to help lecturers decide what depth of treatment should be given to the topics attached to each of the outcomes. Whilst it is not mandatory for a centre to use this list of topics below, it is strongly recommended that centres do follow this list as consistency is particularly important in quality.

Where stated standards are superseded, the up to date standards should be used.

Outcome 1

Concepts of QA, QC, TQM, Benchmarking and Key Performance Indicators (16 hours)

Quality Assurance: BS EN ISO 8402 Quality management and quality assurance-vocabulary, ISO 9000 (ISO 9001, ISO 9002), first, second and third party assessment, systems thinking.

Quality Control: inspection (BS EN ISO 8402) advantages and disadvantages, statistical analysis of concrete cube test results.

Total Quality Management: internal and external customer, concern for continual improvement, accurate measurement.

Benchmarking: internal, competitive and functional benchmarking.

Key Performance Indicators: Construction Best Practice Programme charts.

Outcome 2

Lean Production (10 hours)

Key concepts: Just-in-time, automation, flexible working and creative thinking.

Five lean principles: specify value, identify the value stream, flow, pull, and perfection.

Higher National Unit specification: support notes (cont)

Unit title: Quality in Construction

Outcome 3

Use improvement techniques (12 hours)

The seven 'old' tools of quality as emphasised by Kaoru Ishikawa which are:

Cause and effect diagrams

- ◆ check sheets
- ◆ control charts
- ◆ histograms
- ◆ pareto charts
- ◆ scatter diagrams
- ◆ stratification (flow charts)

The seven 'new' tools of quality (as promoted by the Union of Japanese Scientists and Engineers (JURE)) which are:

- ◆ affinity diagrams
- ◆ relations diagrams
- ◆ tree diagrams
- ◆ matrix diagrams
- ◆ matrix data analysis
- ◆ arrow diagrams
- ◆ process decision programme charts.

Statistical process control

Unit Assessment (2 hours)

Guidance on the delivery and assessment of this Unit

This Unit requires that candidates have a sound understanding of construction technology, materials and processes. Therefore it is suggested that the unit should be studied later in the second year of a two year programme. Case studies are important in raising awareness of the importance of quality systems and standards in industry. In addition, role play, oral presentations, and group work encourage discussions and present opportunities to generate appropriate evidence to contribute to the assessment of Core Skills units.

Focus for delivery of this Unit should be the promotion of a Total Quality Management or 'continuous improvement strategy' in construction projects.

Higher National Unit specification: support notes (cont)

Unit title: Quality in Construction

Where available, evidence from the workplace can also be incorporated to enhance the learning outcomes, provided that this evidence is appropriate and authenticated as the student's own work.

Group work may contribute to the assessment. However, planning would be required by the centre to ensure the sufficiency and authenticity of candidate evidence. Arrangements would be required to be put in place to ensure that assessment/s were conducted under controlled, supervised conditions.

Opportunities for developing Core Skills

The following grid provides a general guide to opportunities for the development of Core Skills in this Unit. Opportunities for the development of Core Skills at the output level are more fully identified in the Core Skills Signposting Guide.

Core Skill	Outcome 1	Outcome 2	Outcome 3	Outcome 4	Outcome 5
1 Communication					
Reading					
Writing					
Oral					
2 Numeracy					
Using Number	✓	✓	✓		
Using Graphical Information		✓	✓		
3 IT					
Using Information Technology			✓		
4 Problem Solving					
Critical Thinking					
Planning and Organising		✓			
Reviewing and Evaluating		✓	✓		
5 Working with Others					

Open learning

Given that appropriate materials exist this unit could be delivered by distance learning, which may incorporate some degree of on-line support. However, with regard to assessment, planning would be required by the centre concerned to ensure the sufficiency and authenticity of candidate evidence. Arrangements would be required to be put in place to ensure that assessment/s were conducted under controlled, supervised conditions.

Higher National Unit specification: support notes (cont)

Unit title: Quality in Construction

Candidates with additional support needs

This Unit specification is intended to ensure that there are no artificial barriers to learning or assessment. The additional support needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments or considering alternative Outcomes for Units. For information on these, please refer to the SQA document *Guidance on Alternative Assessment Arrangements for Candidates with Disabilities and/or Additional Support Needs*, which is available on SQA's website: www.sqa.org.uk.

General information for candidates

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On completion of this Unit you should be able to:

- 1 Explain key concepts used in the **measurement and improvement** of quality in construction organisations
- 2 Explain the strategy of **lean** production.
- 3 Use quality **improvement techniques**.

Evidence that you can satisfy the knowledge and skill elements of this unit will be obtained by assessment in controlled, supervised conditions to which you will not be allowed to bring textbooks, handouts or notes.