

SQA Advanced Unit Specification

General information for centres

Unit title: Advanced Pattern Development: An Introduction

Unit code: HV2E 46

Unit purpose: This Unit is designed to enable candidates to produce developments for a number of advanced artefacts. The unit is essentially practical and in many cases will expand previous knowledge gained either in education or industry. Candidates will attain sufficient background information to successfully think through unknown problems and those not previously encountered and be able to make rational comparisons between different methods of surface development in order to make valued judgements as to which method(s) to use.

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

- 1 Prepare the surface developments for the components parts of a fabrication using the method of cutting planes.
- 2 Prepare the surface developments for the components parts of a fabrication using the method of common central sphere.
- 3 Prepare the surface developments for the component parts of a fabrication using the method of triangulation.
- 4 Produce and evaluate surface development information using a computer package.

Credit points and level: 1 SQA Credit at SCQF level 6: (8 SCQF credit points at SCQF level 6*).

**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 National 1 to Doctorates.*

Recommended prior knowledge and skills: Entry is at the discretion of the centre but as the Unit is essentially a specialist unit it would be beneficial if the candidate has some degree of expertise in surface development or equivalent industrial experience

Core Skills: There are opportunities to develop the Core Skill of Using Graphical Information at SCQF level 5 in this Unit, although there is no automatic certification of Core Skills or Core Skills components.

SQA Advanced Unit Specification

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 assessments for Outcomes 1, 2 and 3 can, if required, be combined to form a holistic assessment with the proviso that the guidelines specified in individual outcomes are included. Due to the practical nature of the assessments it is recommended that the total time for assessing outcomes 1, 2 and 3 is eight hours. Emphasis should be placed on drawing completion rather than drawing generation.

Outcome 4 should be assessed by a written and/or graphical exercise, the first part of which can be produced as a laboratory exercise with the information gained used to produce the required assessment. The time for assessment for outcome 4 is 1 hour.

All assessment should be conducted under controlled and supervised conditions.

Unit specification: statement of standards

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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.

Outcome 1

Prepare the surface developments for the components parts of a fabrication using the method of cutting planes

Knowledge and/or skills

- ◆ Joint lines
- ◆ Patterns
- ◆ Design requirements
- ◆ User information

Evidence Requirements

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

A different sample of knowledge and skills items should be made each time the outcome is assessed. Candidates must provide a satisfactory response to all items sampled.

The sample should comprise the following component parts: right cylinder to oblique cone; right cone to sphere; oblique cone to sphere.

Assessment guidelines

Accurate production of joint lines, patterns and user information for the component parts, by the completion of partially completed assignments.

The assessment for this Outcome can if required be combined with Outcome(s) 2 and/or Outcome 3.

All assessment should be conducted under controlled and supervised conditions

SQA Advanced Unit Specification

Outcome 2

Prepare the surface developments for the components parts of a fabrication using the method of common central sphere

Knowledge and/or skills

- ◆ Joint lines
- ◆ Patterns
- ◆ Design requirements
- ◆ User information

Evidence Requirements

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

A different sample of knowledge and skills items should be made each time the outcome is assessed. Candidates must provide a satisfactory response to all items sampled.

The sample should comprise the following component parts: tapered lobster back bend consisting of FOUR segments of which any TWO segments to be produced; 3-way branch piece consisting of TWO conical and ONE cylindrical section – patterns to be produced for ONE conical and the cylindrical section.

Assessment guidelines

Accurate production of joint lines, patterns and user information for the component parts, by the completion of partially completed assignments.

The assessment for this Outcome can if required be combined with Outcome(s) 1 and/or Outcome 3.

All assessment should be conducted under controlled and supervised conditions

Outcome 3

Prepare the surface developments for the component parts of a fabrication using the method of triangulation

Knowledge and/or skills

- ◆ Patterns
- ◆ Design requirements
- ◆ User information

SQA Advanced Unit Specification

Evidence Requirements

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

A different sample of knowledge and skills items should be made each time the outcome is assessed. Candidates must provide a satisfactory response to all items sampled.

The sample should comprise the following component parts: rectangle to circular transition piece with circular section off-centre and inclined; kinked hopper for maximum capacity; 2-way breeches-piece.

Assessment guidelines

Accurate production of patterns and user information for the component parts, by the completion of partially completed assignments.

The assessment for this Outcome can if required be combined with Outcome(s) 1 and/or Outcome 2.

All assessment should be conducted under controlled and supervised conditions

Outcome 4

Produce and evaluate surface development information using a computer package

Knowledge and/or skills

- ◆ Hard copy production
- ◆ Speed, accuracy and cost

Evidence Requirements

Both knowledge and skills items in the Outcome should be assessed and evidence provided in response to specific question. Each candidate will need to demonstrate that he/she can answer questions based on the items shown above.

A different sample question should be asked each time the outcome is assessed. Candidates must provide a satisfactory response to assessed questions.

Candidates should produce a hard copy of any surface development produced manually in a previous Outcome and compare and evaluate the productions in relation to speed, accuracy and cost.

Assessment guidelines

Accurate production of a hard copy of a surface development taken from that produced in a previous Outcome.

Accurate comparison and evaluation.

All assessment should be conducted under controlled and supervised conditions.

SQA Advanced Unit Specification

Administrative Information

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| Unit title: | Advanced Pattern Development: An Introduction |
| Superclass category: | VF |
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SQA Advanced Unit Specification

Unit specification: support notes

Unit title: Advanced Pattern Development: An Introduction

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

Work carried out by the candidate should be product based. Emphasis should be placed on the ability to identify the most appropriate method for developing patterns for a particular component in an assembly. Drawing assignments should be typical examples of fabrications currently produced in industry.

Guidance on the delivery and assessment of this Unit

Exemplar drawings and patterns of all tutorial work should be available for candidates to compare the standard of work produced and where possible the finished dimensions of patterns should be checked by calculation.

Candidates should be instructed on the comparison with regard to accuracy and speed of the methods of finding lines of intersections between component parts of an assembly (cutting planes and common central sphere). They should be made aware that all construction lines necessary for surface development should lie flat on the surface of the component eg a construction line will not lie on a curved surface as it forms a chord to the 'arc' of the surface. On certain occasions it may be impossible to achieve this but the candidate should be fully aware of the resultant error that results in an approximate pattern shape.

The information which is required in outcomes 1-3 is that which should be considered essential to change the patterns from developmental to industrial use.

Outcomes 1, 2 and 3 (33 hours — this includes time for assessment)

Candidates should be issued with a comprehensive range of tutorial work taken from current industrial practice. This should take the form of partially completed elevations and plans where appropriate in order that the candidate can spend the maximum time available gaining the knowledge of the most suitable method of joint line production and processes and methods of producing completed developments and user information.

The candidates should be exposed to a variety of patterns produced from each category using different development methods, having to select the most appropriate and economical method of development for specified component parts of assemblies, extracting user information from drawing specifications and appending to patterns and checking for accuracy by calculating true lengths of specified dimensions. The transfer from scale length to full size should be compared to calculated lengths.

SQA Advanced Unit Specification

Outcome 4 (7 hours — this includes time for assessment)

Candidates should be made aware of the existence of commercial software drawing packages and industrial visits to various local employers should be encouraged. Educational sample packages are available for download from the Internet if centres have difficulty in sourcing examples.

Candidates should also be made aware of the existence of purely mathematical software packages suitable for pattern production.

The assessments for Outcomes 1, 2 and 3 should use partially completed assignments mainly of layout elevations and plans in order to save assessment time. The assessment material for Outcome 4 does not necessarily have to be a drawn pattern development but can be a series of true lengths and co-ordinates produced by a software package.

Opportunities for developing Core Skills

There are opportunities to develop the Core Skill of Using Graphical Information at Intermediate 2 in this Unit, although there is no automatic certification of Core Skills or Core Skills components.

Open learning

Due to the practical nature of this Unit it is highly unlikely that the Unit would be suitable for Open Learning.

Where a centre feels it can offer this mode of delivery appropriate systems will require to be put in place to ensure reliability, authenticity and security of submitted assessment material.

Equality and inclusion

This unit specification has been designed to ensure that there are no unnecessary barriers to learning or assessment. The individual needs of learners should be taken into account when planning learning experiences, selecting assessment methods or considering alternative evidence.

Further advice can be found on our website www.sqa.org.uk/assessmentarrangements.

General information for candidates

Unit title: Advanced Pattern Developments: An Introduction

This Unit has been designed to provide you with the basic knowledge and skills that will enable you to read, understand and complete fabrication drawings requiring layouts and patterns. It will compliment either your earlier work at a lower level or relevant industrial experience. It will introduce you to the methods of producing intersections, converting scale to industrial use and marking drawings with user and operator instructions. The drawings can be produced either manually or by computer generation.

The aim is to develop confidence in producing drawings that can be transferred to the workshop for manufacture.

Outcome 1 concentrates on the lines of intersection produced by the use of cutting planes that will lead to patterns of a conical and cylindrical nature.

Outcome 2 is on the use of the common central sphere to produce intersections with patterns of a similar nature to outcome 1.

Outcome 3 makes use of the method of triangulation to produce patterns of transition pieces going from one input shape to a different output shape and on the same or different planes.

Outcome 4 is designed to give you an insight into other methods of producing joint lines and patterns either by calculation or by computer generation.

The assessments for Outcomes 1 – 3 are the completion of partially drawn layout elevations and plans to produce joint lines of intersection, relevant patterns and user information.

Outcome 4 is assessed by the reproduction of an assessment drawing using either a software or mathematical package and subsequent evaluation of the resulting production.