

SQA Advanced Unit Specification

General information for centres

Unit title: CAD: Visualisation, Rendering and Presentation
(SCQF level 7)

Unit code: HR6H 47

Superclass: CH

Publication date: August 2017

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Unit purpose

This Unit is designed to introduce learners to *CAD: Visualisation, Rendering and Presentation* and will enable them to understand the processes and techniques utilised when creating three dimensional (3D) visualisations for presentation. The Unit allows learners to develop the necessary knowledge and skills to allow them to understand the terminology and advantages of 3D computer visualisation. The Unit also provides learners with the opportunity to develop the practical skills to enable them to create 3D visualisations for presentation.

Outcomes

On successful completion of the Unit the learner will be able to:

- 1 Create 3D computer models for visualisation.
- 2 Create, manipulate and apply materials and lighting for 3D computer rendering.
- 3 Create a presentation of 3D visualisations.

Credit points and level

1 SQA Advanced Credit at SCQF level 7: (8 SCQF credit points at SCQF level 7)

Recommended entry to the Unit

Access is at the discretion of the centre. However, learners should possess a basic knowledge and understanding of 3D modelling techniques. This may be evidenced by possession of SQA Advanced Units in 3D Modelling and/or a Higher in Graphical Communication or equivalent.

Core Skills

Opportunities to develop aspects of Core Skills are highlighted in the support notes for this Unit specification.

There is no automatic certification of Core Skills or Core Skill components in this Unit.

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.

The Unit may be linked/integrated with the following Units: *Computer Aided Draughting and Design: Graded Unit 1; Design Methodology; CAD: 3D Surface and Solid Modelling, CAD: Architectural 1 and CAD: Feature-Based Modelling 1.*

Assessment Support Packs (ASPs) provide assessment and marking guidelines that exemplify the national standard for achievement. Centres wishing to develop their own assessments should refer to existing ASPs to ensure a comparable standard. A list of existing ASPs is available to download from the SQA Advanced subject-specific pages on SQA's website www.sqa.org.uk.

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.

SQA Advanced Unit specification: Statement of standards

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Acceptable performance in this Unit will be the satisfactory achievement of the standards set out in this part of the Unit specification. All sections of the statement of standards are mandatory and cannot be altered without reference to SQA.

Outcome 1

Create 3D computer models for visualisation.

Knowledge and/or skills

- ◆ 3D computer modelling techniques (this being relevant to the software package used)

Outcome 2

Create, manipulate and apply materials and lighting for 3D computer rendering.

Knowledge and/or skills

- ◆ Materials:
 - material library
 - material creation
 - mapping coordinates
 - textures/maps
- ◆ Lighting effects:
 - shadows
 - intensity
 - colour
 - positioning

Outcome 3

Create a presentation of 3D visualisations.

Knowledge and/or skills

- ◆ Visual presentation of 3D visualisations:
 - slides/pages
 - background
 - text
 - images
 - layout

Evidence Requirements for this Unit

Outcome 1

A learner's response can be judged to be satisfactory where evidence provided is sufficient to meet the requirements for each item by showing that the learner is able to:

- ◆ create a minimum of four 3D computer models
- ◆ use a minimum of three 3D modelling techniques
- ◆ produce hardcopy prints of the 3D computer models

Evidence should be generated through assessment undertaken in controlled, supervised conditions. Learners should be allowed to refer to relevant course material.

Outcome 2

A learner's response can be judged to be satisfactory where evidence provided is sufficient to meet the requirements for each item by showing that the learner is able to:

- ◆ select and use a minimum of three materials from the material library
- ◆ create and use a minimum of four materials with at least two incorporating textures/maps
- ◆ apply mapping coordinates to control position, orientation and scale/tiling of materials attached to 3D computer models
- ◆ use and position a minimum of two light types to illuminate the 3D scene (this being relevant to the software package used)
- ◆ apply shadows to a 3D scene from a minimum of one light source
- ◆ manipulate the colour and intensity of the light sources within the scene
- ◆ create a minimum of three rendered solutions, showing a variety of material, lighting and view combinations
- ◆ produce hardcopy prints of the rendered images

Evidence should be generated through assessment undertaken in controlled, supervised conditions. Learners should be allowed to refer to relevant course material.

Outcome 3

A learner's response can be judged to be satisfactory where evidence provided is sufficient to meet the requirements for each item by showing that the learner is able to:

- ◆ create a visual presentation consisting of a minimum of four slides/pages
- ◆ use or create a presentation background
- ◆ add and manipulate text to the presentation
- ◆ import rendered images into the presentation
- ◆ position, scale and orientate images and text within the presentation

Evidence should be generated through assessment undertaken in controlled, supervised conditions. Learners should be allowed to refer to relevant course material.

SQA Advanced Unit specification: support notes

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Unit support notes are offered as guidance and 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

This Unit has been written in order to allow learners to develop knowledge, understanding and skills in the following areas:

- 1 Creation of 3D computer models for visualisation.
- 2 Creation, manipulation and application of materials and lighting for 3D computer rendering.
- 3 Creation of a presentation of 3D visualisations.

This Unit is at SCQF level 7 and has been devised as an optional Unit within the SQA Advanced Certificate and SQA Advanced Diploma in Computer Aided Draughting and Design. However, this does not preclude the use of the Unit in other awards where award designers feel this to be appropriate.

In designing this Unit, the Unit writer has identified the range of topics that would be expected to be covered by lecturers. The writer has also given recommendations as to how much time should be spent on each Outcome assessment. This has been done to help lecturers decide what depth of treatment should be given to the topics attached to each of the Outcomes. While it is not mandatory for centres to use this list of topics, it is recommended that they do so as the assessment for this Unit is based on the knowledge and/or skills and list of topics in each of the Outcomes.

A list of topics for each Outcome is given on the following page. Lecturers are advised to study this list so that they can get a clear indication of the standard of achievement expected of learners in this Unit.

Outcome 1

Create 3D computer models for visualisation. (11 hours)

The following topics are generic in nature but should be put into context by reference to the CAD/visualisation software application being used at the centre:

- ◆ Creation of a minimum of **four** 3D computer models; the techniques used and the model type (eg surfaces/meshes or solids) will be determined by the software being used. It may be useful to base the models around a theme, which will help in the creation of the 3D scene in Outcome 2:
 - Surface techniques could include: ruled, revolved, tabulated, mesh, face, etc.
 - Solid techniques could include: extruded, revolved, swept, lofted, etc.

Learners may use 3D CAD models they have previously created. This may be evidenced by the use of a checklist.

Outcome 2

Create, manipulate and apply materials and lighting for 3D computer rendering. (12 hours)

The following topics are generic in nature but should be put into context by reference to the CAD/visualisation software application being used at the centre:

- ◆ Part of this Outcome is designed to enable learners to create, apply and manipulate materials within a 3D environment. The learners will be given the opportunity to experiment with material selection from the material library, as well as the creation of materials, eg using textures and maps, reflective, transparent and bump. The learners will gain knowledge, understanding and practical skills in the application of materials and mapping coordinates.
- ◆ The second part of the Outcome is designed to enable learners to use and position lights within a 3D scene. The light types will be dependent on the software being used. A minimum of two light types should be used in the scene. The learner should be given the opportunity to experiment with lighting effects, ie intensity, colour and shadows.
- ◆ A minimum of **three** different solutions for the 3D scene incorporating material and lighting should be rendered and saved to file, eg bitmap, jpeg, etc. Hardcopy prints of the three rendered solutions should be produced.

Outcome 3

Create a presentation of 3D visualisations (8 hours)

The following topics are generic in nature but should be put into context by reference to the presentation software application being used at the centre:

- ◆ This Outcome is designed to enable the learners to create a visual presentation consisting of a minimum of four slides/pages. The learner will experiment with backgrounds, text, and imported images of the 3D solutions. The learner will also show consideration for positioning, scale and orientation of the previously named elements.

Guidance on approaches to delivery of this Unit

It is intended that this Unit be presented at all times using the specialist application CAD/visualisation and presentation software available at the centre. Appropriate technical and support material should be available to the learner.

In the delivery of this Unit, learners should be provided with the opportunity to gain as much 'hands on' experience as possible. Each learner should have access to a PC with the CAD/visualisation and presentation software installed. Learners should NOT work in groups.

Guidance on approaches to assessment of this Unit

Evidence can be generated using different types of assessment. The following are suggestions only. There may be other methods that would be more suitable to learners.

Centres are reminded that prior verification of centre-devised assessments would help to ensure that the national standard is being met. Where learners experience a range of

assessment methods, this helps them to develop different skills that should be transferable to work or further and higher education.

Outcomes 1, 2 and 3 in this Unit should be practical.

All Outcomes may be integrated into a single assignment. The assignment tasks should involve creating 3D computer models; creating, manipulating and applying materials and lighting to a 3D scene; producing computer images of 3D visualisations for inclusion in a presentation. The assignment should be completed in 9 hours. Learners should be allowed to refer to relevant course material. This assignment should be carried out at the end of the delivery of the Unit.

These assessments should be conducted under controlled, supervised conditions.

Learners whose assessment response does not meet the minimum evidence will be offered remediation and resubmission to reflect industry practice.

Assessment guidelines

Outcome 1

The assessment for this Outcome should take the form of a single practical exercise. The assessment can be carried out after the topic has been taught or at the end of the Unit. This is at the discretion of the presenting centre. The time allocation for the assessment is 3 hours. It is recommended that centres develop checklists to support the assessment requirements for each of the knowledge and/or skills items.

Outcome 2

The assessment for this Outcome should continue from Outcome 1 and should take the form of a practical exercise. The assessment can be carried out after the topic has been taught or at the end of the Unit. This is at the discretion of the presenting centre. The time allocation for the assessment is 4 hours. It is recommended that centres develop checklists to support the assessment requirements for each of the knowledge and/or skills items.

Outcome 3

The assessment for this Outcome should continue from Outcome 2. The assessment for this Outcome should take the form of a practical exercise. The assessment can be carried out after the topic has been taught or at the end of the Unit. This is at the discretion of the presenting centre. The time allocation for the assessment is 2 hours. It is recommended that centres develop checklists to support the assessment requirements for each of the knowledge and/or skills items.

Opportunities for e-assessment

E-assessment may be appropriate for some assessments in this Unit. By e-assessment we mean assessment which is supported by Information and Communication Technology (ICT), such as e-testing or the use of e-portfolios or social software. Centres which wish to use e-assessment must ensure that the national standard is applied to all learner evidence and that conditions of assessment as specified in the Evidence Requirements are met, regardless of the mode of gathering evidence. The most up-to-date guidance on the use of e-assessment to support SQA's qualifications is available at www.sqa.org.uk/e-assessment.

Opportunities for developing Core and other essential skills

There are opportunities to develop the Core Skills of *Problem Solving*, *Communication* and *Working with Others* at SCQF level 6 in this Unit, although there is no automatic certification of Core Skills or Core Skills components. Although communication skills are not formally assessed, learners will be expected to analyse, produce and present written and oral materials to standards acceptable in industry, and to express essential ideas and information accurately and coherently. They should ensure that the information they communicate has been considered, is accurate and is effectively presented to meet the needs of purpose and users. Presentations should demonstrate that learners are able to:

- ◆ collate, organise and structure accurate information effectively
- ◆ signpost key points
- ◆ select and produce support materials for their impact
- ◆ use appropriate non-verbal communication techniques
- ◆ respond to any questions in a way that progresses communication

History of changes

Version	Description of change	Date

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SQA acknowledges the valuable contribution that Scotland's colleges have made to the development of SQA Advanced qualifications.

FURTHER INFORMATION: Call SQA's Customer Contact Centre on 44 (0) 141 500 5030 or 0345 279 1000. Alternatively, complete our Centre Feedback Form.

General information for learners

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This section will help you decide whether this is the Unit for you by explaining what the Unit is about, what you should know or be able to do before you start, what you will need to do during the Unit and opportunities for further learning and employment.

This Unit has been designed to provide you with the knowledge and skills that will enable you to understand the basic concepts of *CAD: Visualisation, Rendering and Presentation*.

This Unit will also allow you to develop practical skills that will enable you to create 3D visualisations and presentations.

The formal assessment for this Unit is practical.

The actual assessment times are as follows:

Outcome 1	Practical	3 hours
Outcome 2	Practical	4 hours
Outcome 3	Practical	2 hours

You will be asked to satisfactorily create 3D models; visualisations and presentations will assess your practical skills.

At the discretion of the individual centres, all Outcomes can be carried out after the teaching of the appropriate topics or as an integrated assignment, this will not usually be attempted until all teaching has been completed.