SQA Advanced Unit specification

General information

Unit title: CAD: Cloud Technologies (SCQF level 7)

Unit code: HV1P 47

Superclass: CC

Publication date: June 2018

Source: Scottish Qualifications Authority

Version: 02

Unit purpose

This Unit will focus on developing knowledge and practical skills in the use of CAD based cloud technology. Learners will develop practical CAD skills and underpinning knowledge of the advantages and disadvantages of Cloud Based CAD systems as they would be used in an industrial environment.

Outcomes

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

1 Compare the differences between current Cloud Based and Desktop CAD systems.
2 Create 3D models within a Cloud Based CAD System.
3 Render and animate 3D models within a Cloud Based CAD System.
4 Manufacture within a Cloud Based CAD System.

Credit points and level

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

Recommended entry to the Unit

Access to this Unit is at the discretion of the centre. However, it is recommended that learners possess a basic knowledge and understanding of 3D modelling techniques and Feature-Based Modelling software. This may be evidenced by the possession of SQA Advanced Units HV1K 47 *CAD: 3D Surface and Solid Modelling*, HV1G 47 *CAD: Feature-Based Modelling 1* and/or a Higher in Graphic 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.

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

Compare the differences between current Cloud Based and Desktop CAD systems.

Knowledge and/or Skills

- Differences between the operation of a Cloud Based CAD software compared to desktop software
- Advantages of cloud based CAD software
- Disadvantages of cloud based CAD software

Outcome 2

Create 3D models within a Cloud Based CAD System.

Knowledge and/or Skills

- 3D modelling techniques within a cloud based CAD software
- Assembly modelling techniques within a cloud based CAD software
- Managing files in a cloud based CAD software

Outcome 3

Render and animate 3D models within a Cloud Based CAD System.

Knowledge and/or Skills

- Create a functional animation of a 3D assembly model
- Render a functional animation using a cloud based service

Outcome 4

Manufacture within a Cloud Based CAD System.

Knowledge and/or Skills

- Create a CAD/CAM cloud based machining sequence
- Simulate a CAD/CAM cloud based machining sequence
- CNC tool types and tool paths

Evidence Requirements for this Unit

Learners will need to provide written and/or oral recorded and product based evidence to demonstrate their Knowledge and/or Skills across all Outcomes. Evidence should be generated under controlled, supervised, open-book conditions. Learners will be allowed access to course material, text books, the internet and the Help files associated to the software used. All evidence must be generated during the assessment period.

Outcome 1

The assessment for this Outcome should take the form of written and/or oral recorded evidence. The learner should demonstrate an understanding of how a Cloud Based CAD system operates in comparison to a desktop system. This should include/explain:

- four advantages of using a Cloud Based CAD system, these could include:
  - Lesser computer specification required
  - Greater processing power available
  - Cost Saving
  - Reliability
  - Workload flexibility
  - Collaboration

- four disadvantages of using a Cloud Based CAD system, these could include:
  - Potential downtime
  - Security
  - Vendor lock-in
  - Limited control
  - Internet usage

Outcome 2

The assessment for this Outcome will take the form of a practical exercise, where the learner should be able to:

- create a minimum of 4 3D models using a minimum of 3 modelling techniques using a Cloud Based CAD system.
- create a functional assembly model consisting of at least 6 parts using a Cloud Based CAD system.
- submit/share access to the digital CAD files created.

Outcome 3

The assessment for this Outcome will take the form of a practical exercise, where the learner should be able to:

- create a functional animation using a cloud based CAD system.
- render a functional animation using a cloud based service.
- submit a digital copy of the rendered video file.

Outcome 4

The assessment for this Outcome will take the form of a practical exercise, where the learner should be able to:

- create a CAD/CAM cloud based machining sequence with a minimum of 3 operations and 2 tools.
- simulate the CAD/CAM cloud based machining sequence.

Outcomes 2, 3 and 4 could be assessed holistically, using a project based assignment. The learner could create and assemble part models in Outcome 2, use these models in Outcome 3 for animation purposes, and select one for machining in Outcome 4.

SQA Advanced Unit 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 developed in order to allow learners to develop knowledge, understanding and skills in the following areas:

1 The key aspects of using a cloud based CAD system, including the advantages/disadvantages.
2 Creation of 3D part models and functional assemblies.
3 Creation of functional animations and rendering using a cloud based CAD file.
4 Creating and simulating a CAD/CAM machining sequence.

This Unit is at SCQF level 7 and may form part of a group award or be completed as a free-standing Unit.

In designing this Unit, a range of topics have been identified that would be expected to be covered by lecturers. Recommendations have also been included as to how much time should be spent on each Outcome assessment. This information has been provided 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 Support Pack developed for this Unit is based on the Knowledge and/or Skills and Evidence Requirements in this Unit.

It is recommended that learners possess a basic knowledge and understanding of 3D modelling techniques and Feature-Based Modelling software prior to undertaking this Unit. This may be evidenced by the possession of SQA Advanced Units HV1K 47 *CAD: 3D Surface and Solid Modelling*, HV1G 47 *CAD: Feature-Based Modelling 1* and/or a Higher in Graphic Communication or equivalent.

Guidance on approaches to delivery of this Unit

It is intended that this Unit be delivered using the specialist CAD software available at the delivering centre.

Learners should be provided with the opportunity to gain as much ‘hands on’ experience as possible. Appropriate technical and support material should be available, and each learner should have access to a PC, internet and CAD software.

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

Outcome 1

Compare the differences between current Cloud Based and Desktop CAD systems.

- How a cloud based system works
- Advantages of this type of system
- Drawbacks/disadvantages of this type of system

Outcome 2

Create 3D models within a Cloud Based CAD System.

- Creation of 3D models using a variety of techniques
- Creation of functional assemblies
- Sharing digital files in the cloud from a CAD based software

Outcome 3

Render and animate 3D models within a Cloud Based CAD System.

- Setting up a functional animation
- Cameras, lighting and model transparency
- Rendering a video file output

Outcome 4

Manufacture within a Cloud Based CAD System.

- CNC tools and toolpaths
- Creation of a machining sequence
- Simulation of a machining sequence

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.

Outcome 1 should take the form or a written report and/or oral presentation. Outcomes 2, 3 and 4 should take the form of practical exercises. These assessments can be carried out after each topic has been taught or at the end of the Unit as a combined assessment project. This is at the discretion of the presenting centre. It is recommended that centres develop checklists to support the assessment requirements for each of the Knowledge and/or Skills items.

Outcome 1 should take no longer than 1 hour.

Outcome 2 should take no longer than 3 hours.

Outcome 3 should take no longer than 1 hour.

Outcome 4 should take no longer than 1 hour.

Evidence for all Outcomes will be generated under controlled, supervised open-book conditions. Learners will be allowed access to course material, text books, the internet and the Help files associated to the software used. All evidence must be generated during the assessment period.

During the practical activities, staff observation is advised to help authenticate work produced. In addition, centres may choose to employ the use of a student signed statement of authenticity.

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

Learners will have opportunities to develop the Core Skills of *Numeracy, Information and Communication Technology (ICT)*, and *Problem Solving* at SCQF level 6 in this Unit, although there is no automatic certification of Core Skills or Core Skills components.

Numeracy — *Numeracy* skills will be developed as learners will have to work with complex 3D geometric models, this will utilise an understanding of geometric math and coordinate systems, regularly requiring arithmetic skills to make adjustments.

Problem Solving — Learners will need to overcome difficulties arising during the 3D modelling process and machining operations, as well as overcome any difficulties working with a cloud based software.

Information and Communication Technology (ICT) — Learners will need to work with online systems and show an understanding of the technical differences between this and desktop software.

In addition to Core Skills, as the Unit is intended to be delivered to emulate a working environment as project based learning, learners will have the opportunity to develop **Citizenship and Employability skills.**

History of changes to Unit

Version	Description of change	Date
02	Superclass changed from VF to CC	June 2018

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

Unit title: CAD: Cloud Technologies (SCQF level 7)

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.

Access to this Unit is at the discretion of the centre. However, it is recommended that you possess a basic knowledge and understanding of 3D modelling techniques and Feature-Based Modelling software. This may be evidenced by the possession of SQA Advanced Units in Computer Aided Draughting and/or a Higher in Graphic Communication or equivalent.

You will develop knowledge of:

1 The key aspects of using a cloud based CAD system, including the benefits/drawbacks.
2 Creation of 3D part models and functional assemblies.
3 Creation of functional animations and rendering using a cloud based CAD file.
4 Creating and simulating a CAD/CAM machining sequence.

This Unit will allow you to develop practical skills that will enable you to create these models and functional assemblies.

The formal assessment for this Unit is practical although there is a small written assessment requirement.

Your practical skills will be assessed by your being asked to satisfactorily create 3D models, assemblies, functional animations and CAD/CAM machining sequences. You will be presented with the basic drawing, sizes and machining information that are needed to create these outputs.

You will have opportunities to develop the Core Skills of *Numeracy, Information and Communication Technology (ICT)*, and *Problem Solving* at SCQF level 6 in this Unit, although there is no automatic certification of Core Skills or Core Skills components.