

SQA Advanced Unit specification

General information

Unit title: CADD Skills (SCQF level 7)

Unit code: HV1J 47

Superclass: CH

Publication date: November 2017

Source: Scottish Qualifications Authority

Version: 01

Unit purpose

This Unit has been designed to provide learners with an opportunity to develop practical CADD skills and produce a personal CADD portfolio. The main purpose of this Unit is to provide learners with an appreciation of what is involved in using their CADD skills in simulated industrial situations. This Unit is suitable for any learner who wishes to develop practical skills in a range of CAD applications.

Outcomes

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

- 1 Evaluate drawings or designs to current standards.
- 2 Produce a range of production 2D drawings.
- 3 Reverse engineer components, products or structures.
- 4 Redesign a simple artefact.

Credit points and level

2 SQA Credits at SCQF level 7: (16 SCQF credit points at SCQF level 7)

SQA Advanced Unit Specification

Recommended entry to the Unit

While entry to the Unit will be at the discretion of the centre, it is recommended that the learner should have completed, or be in the process of completing the following Units:

HP4A 47	<i>Communication: Practical Skills</i>
HR3L 47	<i>CAD: 2D I</i>
HR3H 47	<i>CAD: 2D II</i>
HV1K 47	<i>CAD: 3D Surface and Solid Modelling</i>
HR7H 47	<i>CAD: User Systems</i>
HV1D 47	<i>CAD: Principles</i>
HV1E 47	<i>Design Methodology</i>
HV1G 47	<i>CAD: Feature Based Modelling 1</i>

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 Assessment Support Pack (ASP) for this Unit provides assessment and marking guidelines that exemplify the national standard for achievement. It is a valid, reliable and practicable assessment. Centres wishing to develop their own assessments should refer to the ASP to ensure a comparable standard. A list of existing ASPs is available to download from SQA's website (<http://www.sqa.org.uk/sqa/46233.2769.html>).

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

Unit title: CADD Skills (SCQF level 7)

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

Evaluate drawings or designs to current standards.

Knowledge and/or Skills

- ◆ Checking drawings to/for:
 - BS Standards
 - In-house standards
 - Dimensional accuracy
 - Technical accuracy

Outcome 2

Produce a range of production 2D drawings.

Knowledge and/or Skills

- ◆ Technical drawing:
 - Appropriate views
 - All dimensions
 - Drawing border
 - Notes and/or instructions
- ◆ Drawing categories:
 - Architectural
 - Circuit diagram
 - Electrical
 - Fabrication
 - Installation
 - Mechanical
 - Assembly
 - Sub Assembly

Outcome 3

Reverse engineer components, products or structures.

Knowledge and/or Skills

- ◆ Planning:
 - Assess component function
 - Identify Health and Safety requirements
 - List measuring equipment

SQA Advanced Unit Specification

- ◆ Record data:
 - Create component sketches
 - Measure and record all dimensions
 - Reference dimensions
 - Record key features or finishes
- ◆ Technical drawing:
 - Appropriate views
 - All dimensions
 - Suitable drawing scale
 - Drawing border
 - Notes and/or instructions
 - Print/plot finished drawing

Outcome 4

Redesign a simple artefact.

Knowledge and/or Skills

- ◆ Planning:
 - Assess component function
 - Determine product needs
- ◆ Concept:
 - New concept sketch
- ◆ Model:
 - 3D model.
 - 2D drawing
 - Print/plot finished model

Evidence Requirements for this Unit

Outcome 1

Learners will need to provide evidence to demonstrate their Knowledge and/or Skills by showing that they can:

- ◆ complete a minimum of two evaluation tasks.

Evidence should be available in the learner's log book demonstrating that he/she can:

- ◆ check a print of each completed drawing.
- ◆ print/plot a finished copy of each drawing.
- ◆ complete a log for each task.

SQA Advanced Unit Specification

Outcome 2

Learners will need to provide evidence to demonstrate their Knowledge and/or Skills by showing that they can:

- ◆ complete a minimum of four drawings using all the technical drawing knowledge and incorporating at least three different drawing categories.

Evidence should be available in the learner's log book demonstrating that he/she can:

- ◆ print/plot a finished copy of each drawing incorporating at least two different sheet sizes.
- ◆ produce a check print of each completed drawing.
- ◆ complete a log for each completed drawing.

Outcome 3

Learners will need to provide evidence to demonstrate their Knowledge and/or Skills by showing that they can:

- ◆ complete a minimum of two reverse engineering tasks.

Evidence should be available in the learner's log book demonstrating that he/she can:

- ◆ complete a log for each task incorporating their records for each stage of the process.
- ◆ print/plot a copy of each drawing.

Outcome 4

Learners will need to provide evidence to demonstrate their Knowledge and/or Skills by showing that they can:

- ◆ complete the redesign of a simple artefact.

Evidence should be available in the learner's log book demonstrating that he/she can:

- ◆ complete a log for the redesign incorporating their records for each stage of the process.
- ◆ print/plot a copy of the finished model and/or drawings.

SQA Advanced Unit Support Notes

Unit title: CADD Skills (SCQF level 7)

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 80 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 practical skills in the application of CADD.

This Unit is **not** intended to produce a skilled draughtsperson or designer. Rather this Unit is designed to allow learners to develop their CADD skills and provide an appreciation of what is involved in a range of practical CADD disciplines.

The Unit has been designed to allow learners the opportunity to develop their individual 2D and 3D CADD skills. It is recommended that the learner should have completed, or be in the process of completing, these skills from the Units outlined in the recommended prior knowledge and skills section prior to undertaking this Unit.

Guidance on approaches to delivery of this Unit

The Unit should be delivered predominantly using practical exercises that will allow the learner to use their skills in a simulated industrial situation. It is anticipated that learners will produce a series of drawings and designs that will encourage the development of each individual's CADD skills. Evidence will be gathered from the production of a range of drawings and the completion of a log book. Both forms of evidence should show the completed knowledge and understanding elements as well as the process and techniques involved. On completion the log book should be retained by the learner.

Outcome 1 — Evaluate drawings or designs to current standards. **(10 hours)**

The aim of this Outcome is to provide learners with the opportunity to develop practical experience of checking drawings.

Knowledge and/or Skills

- ◆ Checking drawings to/for:
 - BS Standards
 - In-House standards
 - Dimensional accuracy
 - Technical accuracy

SQA Advanced Unit Specification

Evidence Requirements

Learners will need to provide evidence to demonstrate their Knowledge and/or Skills by showing that they can:

- ◆ complete a minimum of two evaluation tasks.

Evidence should be available in the learners log book demonstrating that he/she can:

- ◆ a check print of each completed drawing.
- ◆ print/plot a finished copy of each drawing.
- ◆ complete a log for each task.

Outcome 2 — Produce a range of production 2D Drawings (25 hours)

The aim of this Outcome is to provide learners with the opportunity to develop practical experience in a discipline of the learner's choice. The focus of the Outcome is to provide the learner with an opportunity to develop their CADD skills while at the same time produce technically correct drawings within a given timescale.

Ideally centres will have access to authentic industrial drawings that learners can utilise. The four drawings could increase in complexity as the learner's skills develop. Suggested challenges could be:

- ◆ modify existing drawings
- ◆ redraw existing drawings
- ◆ small groups produce individual drawings which are shared to produce a finished assembly

On completion, all drawings should be printed to scale and submitted to the lecturer for checking. This process should reflect industry practice with the check prints returned to the learner for feedback and to update any changes. Check prints should be retained in the learner's log book.

Centres should develop a standard template for the log book. Each task should have a single sided, A4 page that allows learners to summarise the skills they developed and/or experience gained. A front page in the style of a drawing register would also help learners provide a structure to their log book.

Outcome 3 — Reverse engineer components, products or structures. (20 hours)

The aim of this Outcome is to provide learners with the opportunity to gather their own data then produce a working drawing. The focus of this Outcome is to provide the learner with an opportunity to develop skills to support their CADD knowledge while at the same time produce a technically correct drawing or model within a given timescale. The Outcome has been structured in three stages to encourage learners to adopt a methodical approach to the tasks.

Planning

Learners should be encouraged to review and prepare appropriately for the task. For example, what is the scope of the problem? Are any assumptions made? Are there any health and safety issues? Eg A component may be damaged or contaminated. A workshop may have equipment and/or machinery that require isolation.

SQA Advanced Unit Specification

Part of the planning process should include identifying the resources required including personnel, measuring and recording equipment. Each learner should be encouraged to estimate the time required to complete the task.

Recording data

Learners should prepare freehand sketches of the assignment before measuring and recording dimensions. As part of the recording process additional reference dimensions should be included to act as a check. As part of the recording process learners should also include relevant notes and comments of any special features adopting the appropriate industry terminology.

Technical drawing

Using the data gathered learners should produce a suitable working drawing. On completion, all drawings should be printed to scale and submitted to the lecturer for checking. This process should reflect industry practice with the check prints returned to the learner for feedback and to update any changes. Check prints should be retained in the log book.

Each task should have a single sided, A4 page that allows learners to summarise the skills they developed and experience gained.

Suggested tasks

One of the reverse engineering tasks may be carried out as a small group exercise with each member producing his/her own detail drawing and log book entry. Working as a group may allow learners opportunities to develop interpersonal skills while undertaking a common challenge. Some potential assignments could include:

- ◆ a single component that combines with others to produce a sub assembly
- ◆ a site survey of a classroom, workshop, or part of the centre's estate

Outcome 4 — Redesign a simple artefact. (25 hours)

The aim of this Outcome is to provide learners with the opportunity to develop practical experience in 3D modelling within a given timescale. The Outcome has been structured in three stages to encourage learners to adopt a methodical approach to the task. Learners should be encouraged to select their own individual assignment from a range of every day objects. Example assignments could be everyday items such as a tape dispenser, hole punch, pedal bin or bottle opener.

The log book should have a single sided, A4 page to allow learners to summarise the skills they developed and experience gained. The log should incorporate the learners' records for each stage of the process as well as copies of the final design. It may be possible to incorporate this Outcome with the Unit HV1E 47 *Design Methodology* which would allow learners an opportunity to develop a model of their chosen design.

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

SQA Advanced Unit Specification

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

Evidence of practical performance should be used to verify the learner's capabilities. A log book accompanying a portfolio of completed drawings and/or designs for the Outcomes should be used to verify the learner's Knowledge and/or Skills. The lecturer should sign-off each completed task.

Assessment Guidelines

Outcome 1

It is recommended that the practical exercise(s) be set to allow a learner to develop all the skills in the knowledge/skills criteria. Learners may be interviewed to check and support their knowledge and understanding of each subject discipline.

Outcome 2

It is recommended that the practical exercise(s) be set to allow a learner to develop skills in a range of drawing categories from the knowledge/skills criteria. Learners' work should sample a range of industrial drawings, designs or assemblies. Learners may be interviewed to check and support their knowledge and understanding of each subject discipline.

Outcome 3

It is recommended that the practical exercise(s) be set to allow a learner to develop all the skills in the knowledge/skills criteria. One of the reverse engineering tasks may be carried out as a small group exercise with each member producing his/her own detail drawing and log book entry. Learners may be interviewed to check and support their knowledge and understanding of each subject discipline.

Outcome 4

Evidence of practical performance should be used to verify the learners' capabilities. The log book and finished design should be used to verify each learner's Knowledge and/or Skills for this Outcome. The lecturer should then sign-off the completed log book and check list.

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

Centres have an opportunity to develop the Core Skills of Providing/Creating Information from *Information and Communication Technology (ICT)*, Critical Thinking from *Problem Solving* and Reviewing Co-operative Contribution from *Working with Others* all at SCQF level 6. There are also opportunities to develop the Core Skills of Planning and Organising from

SQA Advanced Unit Specification

Problem Solving and *Working Co-operatively with Others* from *Working with Others* all at SCQF level 5, although there is no automatic certification of Core Skills or Core Skills components.

History of changes to Unit

Version	Description of change	Date

© Scottish Qualifications Authority 2010, 2013, 2016, 2017

This publication may be reproduced in whole or in part for educational purposes provided that no profit is derived from reproduction and that, if reproduced in part, the source is acknowledged.

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: CADD Skills (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.

This Unit has been designed to allow you to develop your knowledge and skills in CADD. On completion of this Unit your log book will be returned to you as evidence of the skills you have developed on your course. Excellent practical CADD skills supported by a high quality log book are likely to prove useful in either employment or progressing to higher education.

The first Outcome deals with the practical skill of checking completed drawings to current BS standards. The ability to accurately inspect finished drawings is an essential skill that all CADD operators should develop. The work carried out in this Unit will be recorded in your log book as you complete a number of drawing checks.

The second Outcome is an opportunity for you to produce industry base drawings in a simulated CADD environment. You will create at least four drawings from different CADD disciplines such as Engineering, Architectural, or Fabrication. Your finished work will be printed and recorded in your log book.

The third Outcome, reverse engineering, is designed to provide you with the opportunity to gather your own data which will then be used to produce a working drawing. This practical experience will increase your CADD knowledge but at the same time challenge you to produce a technically correct drawing or model within a given timescale. Part of this Outcome may also be carried out in small groups which should give you the opportunity to experience using your CADD skills as part of a small team. The completed tasks will be recorded in your log book.

The aim of the fourth Outcome is to provide you with the opportunity to develop practical experience in 3D modelling within a given timescale. You will be required to redesign and model an everyday product. The Outcome has been structured in three stages to encourage you to adopt a methodical approach to the modelling task. Your log book should include your records for each stage of the process as well as copies of your final design.