



**Post Validation document for the  
Professional Development Award  
in  
G8LD 47  
Computer Aided Draughting and Design  
at SCQF level 7**

**Wednesday 3 October 2007**

# Contents

|       |   |    |
|-------|---|----|
| 1     | Introduction .....  | 1  |
| 2     | Rationale.....  | 1  |
| 2.1   | Title of the award .....  | 1  |
| 2.2   | Purpose of the Group Award.....   | 1  |
| 2.2.1 | DIVA Partnership .....  | 2  |
| 2.3   | Target Client Group.....  | 3  |
| 2.3.1 | Industry CADD Users .....   | 3  |
| 2.3.2 | Novice CADD Users .....   | 3  |
| 2.3.3 | Teachers, Lecturers and Trainers .....  | 3  |
| 2.4   | Progression routes .....  | 3  |
| 2.5   | Links to other SQA developments .....   | 4  |
| 2.6   | Links to National Occupational Standards .....  | 4  |
| 3     | Aims .....  | 5  |
| 3.1   | General aims .....  | 5  |
| 3.2   | Specific aims .....   | 5  |
| 3.3   | Subject specific aims .....   | 5  |
| 3.4   | Unit Mapping to Aims.....   | 6  |
| 4     | Access to the PDA CADD award.....   | 6  |
| 4.1   | Access requirements.....  | 6  |
| 5     | Structure .....   | 7  |
| 5.1   | The framework .....   | 7  |
| 5.2   | The award .....   | 7  |
| 5.3   | Example course programmes .....   | 8  |
| 5.3.1 | Course programme (Novice user) .....  | 8  |
| 5.3.2 | Course Programme (Engineering).....   | 8  |
| 5.3.3 | Course Programme (Architectural) .....  | 9  |
| 5.4   | Progression .....   | 9  |
| 5.5   | Core Skills .....   | 10 |
| 5.5.1 | Core Skills Entry profile.....  | 11 |
| 5.5.2 | Core Skills Exit profile.....   | 11 |
| 6     | Approaches to delivery and assessment .....   | 11 |
| 6.1   | Content and context.....  | 11 |
| 6.2   | Delivery and assessment .....   | 12 |
| 6.2.1 | Delivery .....  | 12 |
| 6.2.2 | Assessment .....  | 12 |
| 6.3   | Open and Distance Learning .....  | 13 |
| 6.4   | Candidates' information .....   | 14 |
| 6.4.1 | General information .....   | 14 |
| 6.4.2 | Course content.....   | 14 |
| 6.4.3 | Entry criteria.....   | 15 |
| 6.4.4 | Assessment methods.....   | 15 |
| 6.4.5 | Progression .....   | 16 |
| 7     | Appendices .....  | 16 |
|       | Appendix 1: Industry/FE Questionnaire (Responses) .....                                   | 17 |
|       | Appendix 2: Labour Market Intelligence sourced from SEMTA report .....                    | 27 |
|       | Appendix 3: HNC Computer Aided Draughting and Design Framework and Unit Descriptors ..... | 30 |
|       | Appendix 4: SEMTA Mapping .....   | 32 |
|       | Appendix 5: Unit Grid Core Skills .....   | 35 |

# 1 Introduction

This is the validation document for the PDA in Computer Aided Draughting and Design (referred to as CADD) at SCQF level 7.

This new PDA is designed to equip candidates with the knowledge, understanding and skills required for success in current and future employment and for progression to further academic and/or professional qualifications. The PDA aims to help individuals, at various stages of their professional development, to gain a qualification that confirms their ability in the use of CADD relevant to current industry practice.

## 2 Rationale

### 2.1 Title of the award

The title of the award, PDA in Computer Aided Draughting and Design at SCQF level 7, reflects the nature of the content, context and level of the award. As a PDA, it is clearly a vocational qualification contributing to continuous professional development for employed participants or those seeking employment as a CAD technician.

### 2.2 Purpose of the Group Award

During the development of the HNC CADD award the Steering group and Qualification Design Team (QDT) for this award discussed the need for a PDA award. Members of both groups came from centres delivering the HNC qualification as well as centres potentially interested in the new award and both groups met regularly throughout the development of the revised qualification. The following bullet points list the main issues discussed:

- ◆ entry into and progression from the PDA award
- ◆ the future of the PDA award: Certificate in CAD

The outcome of these discussions was that there is a requirement for a new PDA award in CADD (based on constituent Units of the HNC).

It is the belief of the Qualification Design Team that Computer Aided Draughting and Design is an integral part of the design process for many industries. A range of skills and techniques such as Detail/Layout drawings, 3D concept models, 3D visualisations, analysis and simulation data, and bills of material can all be generated and performed through the application of CADD technology.

The purpose of the PDA Computer Aided Draughting and Design Group Award is to foster these skills and techniques using industry standard equipment and software. The design and content of the PDA framework is aimed at providing the candidate with the opportunity to develop practical CADD skills relevant to industry applications.

The proposed award seeks to provide a mechanism for the development of these skills and techniques. In undertaking the required Units, candidates will work through a series of practical activities directly related to their chosen fields with the aim of developing and improving their personal capabilities which should be of benefit within their working environment.

To ascertain the needs of industry and Further Education, an SQA questionnaire was sent to various industrial and FE contacts. This represented a good spread of relevant industries and further education colleges. Responses to this consultation show widespread support for the introduction of a new PDA in CADD. The consultation process confirmed the range of mandatory and optional Units would meet the needs of industries through the flexibility of the course design. A summary and sample of individual responses and comments are included in Appendix 1.

In addition, and in order to verify the feedback from Industry, desk-based research was undertaken by gathering and analysing data from various sources (SEMTA, and Future Skills Scotland). The research highlights a shortage of CADD skills across a broad range of engineering and manufacturing disciplines. The consultation confirms that there is a continued demand for appropriately qualified/skilled CAD users. Industry continues to identify a skills gap in the work force, and a need for specialist training in Computer Aided Draughting and Design. The introduction of a PDA in CADD will allow Further Education Colleges the opportunity to tackle the shortage of these skills by providing the specialist training the sector requires. The labour market intelligence is included in Appendix 2.

Following comments and observations from the SQA validation panel a second questionnaire was circulated to seek additional clarification regarding the use of design in the title of the award and the inclusion of CAD: Principles as a mandatory Unit rather than an option. Responses on the award title highlighted the different views held across the CADD fraternity but the majority supported the inclusion for a range of reasons as shown in Appendix 2.

Feedback on the CAD: Principles Unit was again divided but the majority view was that although the Unit was important for novice and engineering candidates it wasn't mandatory for those with, for example, an architectural bias. Comments also spoke against the increase of the mandatory section to four credits citing the loss of flexibility as the main criticism. This feedback demonstrates the need to provide a flexible award while at the same time providing clear recommendations on course content for a range of key client groups. In order to provide clear guidance sample course programmes have been included in section 5.3 that reflect and incorporate the feedback on this issue.

### **2.2.1 DIVA Partnership**

DIVA — the Digital media and ICT Vendor Alliance is a new programme of collaboration between Scottish education, global and local industry and the Scottish Qualifications Authority to expand and enrich Information and Communications Technology (ICT) and digital media qualifications across all relevant subject areas. The Computer Aided Draughting and Design subject area will be supported as part of this new DIVA programme.

The Qualification Design Team believe that the PDA in CADD will complement and in time become an integrated part of the DIVA programme in providing a professional qualification that meets the needs of both education and industry. The QDT expect the PDA in CADD to become a recognised route for teachers, trainers and lecturers looking to improve and standardise their current skills and knowledge of the CADD subject area via the completion of a professional development award.

## **2.3 Target Client Group**

The PDA in Computer Aided Draughting and Design (CADD) is aimed at both the novice and experienced CADD user, providing them with the opportunity to achieve a formal CADD qualification.

### **2.3.1 Industry CADD Users**

The course is considered to be especially relevant to those candidates who already have a qualification or are working in a related industry eg Engineering, Architectural, Construction, Interior Design, or Product Design. These candidates may be required to use a CADD system at work, however the use of CADD is not considered their main area of expertise. These candidates may have the desire to possess a formal qualification in CADD to complement their main qualification or simply to further develop their level of CADD skills.

### **2.3.2 Novice CADD Users**

The PDA in CADD focuses on the basic building blocks of CADD application moving towards more sophisticated CADD skills as the candidate progresses through the course. The PDA is considered to be a good entry point for those candidates wishing to pursue a career as a CADD technician in a variety of industries.

The intention is that this qualification will be of benefit to any new or experienced CADD user, providing a platform for professional development and progression to further study and/or employment.

### **2.3.3 Teachers, Lecturers and Trainers**

Computer Aided Draughting and Design is used in many industries, which means that there is a requirement for well-trained, competent and qualified CAD users. The practitioners involved in the teaching or training of potential/existing industry CAD users should be highly skilled and knowledgeable in the use of CAD. These practitioners are required to continually maintain/update their skills to reflect the advances in the CAD software. This PDA will provide a platform for classroom practitioners to achieve knowledge and skills in the use of CAD to a standard that will benefit them in their daily practice.

Achieving the PDA award will complement existing qualifications of all teachers, lecturers and trainers involved in the delivery of CAD in the classroom.

## **2.4 Progression routes**

An important aim of the award is to enable candidates to progress to further academic and/or professional qualifications. The qualification has been designed to provide candidates with the relevant mix of competencies to enable career progression whilst at the same time allowing candidates an articulation route to the HNC in Computer Aided Draughting and Design.

The PDA is designed as a subset of the HNC award and all credits completed in this PDA are included in the HNC CADD framework. Candidates could progress to the HNC requiring only 6 further credits from the mandatory Units of the HNC framework, shown in Appendix 3.

## 2.5 Links to other SQA developments

The proposed award sits at level 7 in the Scottish Credit and Qualification Framework and is a progression from other SQA qualifications, eg:

Graphic Communication — Intermediate 2/Standard Grade — SCQF level 5  
Graphic Communication — Higher — SCQF level 6

In addition, individual Units have been developed primarily for inclusion in:

HNC Computer Aided Draughting and Design (SCQF levels 7 and 8)

## 2.6 Links to National Occupational Standards

SEMTA is the Sector Skills Council for Science, Engineering and Manufacturing Technologies. As an employer-led body, SEMTA is governed by a Council whose members are made up of employer representatives from the major engineering sectors, the Trade Unions, Local Government, Educationalists and Group Training Associations. SEMTA has been licensed by the Secretary of State for Education and Skills to drive forward the effort to improve the UK's productivity through improvements in its sector's skills base.

A key goal of SEMTA is to improve learning supply, including apprenticeships, higher education and national occupational standards. The national occupational standards are designed to act as a benchmark of best practice.

There are seven SEMTA Units that are considered level 3 occupational standards covering seven functional areas of Computer Aided Draughting and Design. The table detailed in Appendix IV presents a mapping of the seven occupational standards Units against relevant Units and Outcomes from the SQA PDA in Computer Aided Draughting and Design Group Award. It must be pointed out that delivering centres may choose not to deliver the course with an engineering bias. However, a large number of candidates completing the PDA in CADD course could potentially work in an engineering environment, and the occupational standards mapping is therefore believed to be a very worthwhile exercise.

The PDA in Computer Aided Draughting and Design Group Award content covers all aspects of the relevant SEMTA occupational standards providing the identified SQA Units are delivered with an engineering bias. SEMTA have acknowledged, see Appendix 4, their support for the award stating that they will, on approval, add the PDA in Computer Aided Draughting and Design to the Modern Apprenticeship Engineering Framework.

A review of other National Occupational Standards showed that although individual CADD skills are incorporated into a range of standards there was an overall lack of detailed links such as those outlined by SEMTA. Some examples of other National Occupational Standards that contain CADD are shown below.

**FFINTO** (Furniture, Furnishings and Interiors National Training Organisations) — Footwear and Leather Production, Operate CAD equipment.

**SkillFast-UK** — Footwear and Leather Production, Design Patterns using CAD Systems.

**SEMTA** — Jewellery Manufacture, Using Computer Aided Design and Manufacturing Technology.

### **3 Aims**

#### **3.1 General aims**

The general aims of the PDA award are to:

- 1 enhance candidates' employment prospects
- 2 support candidates' Continuing Professional Development and career development
- 3 enable progression within the SCQF (Scottish Credit and Qualification Framework)
- 4 develop candidates' ability to apply analysis and synthesis skills to the solution of Computer Aided Draughting and Design problems
- 5 develop knowledge and transferable skills (including Core Skills)

#### **3.2 Specific aims**

The specific aims of the PDA award are to:

- 6 provide an award that will allow candidates to work now, or in the future, as CAD technicians
- 7 develop an award that on successful completion will allow candidates to progress to the HNC in Computer Aided Draughting and Design
- 8 provide an award that creates a route towards meeting the requirements for professional recognition, such as the Institute of Engineering Designers

#### **3.3 Subject specific aims**

The subject specific aims of the PDA award are to:

- 9 develop knowledge, understanding and skills in a range of core Computer Aided Draughting topics at SCQF level 7
- 10 develop knowledge, understanding and skills in a range of discipline related Computer Aided Draughting topics at SCQF level 7
- 11 develop a range of Communication and Information Technology knowledge and skills relevant to CAD technicians

- 12 allow a degree of specialisation within subject specific disciplines:  
 Visualisation, Feature Based Modelling, Architectural CAD, and Graphical Design.

### 3.4 Unit Mapping to Aims

All the individual Units included within the award are designed to meet all the General and Specific aims of the award. The following grid identifies where the individual Unit specifications match the subject specific aims of the award:

| Unit title                                     | Aims     |
|--|----------|
| CAD: 2D I                                      | 9;10;11  |
| CAD: Principles                                | 9;10;11  |
| CAD: 3D Modelling                              | 9;10;11  |
| CAD: 2D II                                     | 9;10;11  |
| CAD: Visualisation, Rendering and Presentation | 10;11;12 |
| CAD: Feature Based Modelling I                 | 10;11;12 |
| CAD: Graphical Design                          | 10;11;12 |
| CAD: Architectural I                           | 10;11;12 |

The proposed PDA in CADD will provide the candidate with the opportunity to develop a comprehensive level of knowledge and skills related to CADD. The core subjects of the course aim to provide the essential practical skills and knowledge required for working in industry, with the optional subjects aimed at giving the candidate knowledge and skills in specialist CADD subjects.

Overall, a combination of the core principles and specialist options will present candidates with the prospect of developing a broad range of knowledge and skills in CADD related subjects.

## 4 Access to the PDA CADD award

### 4.1 Access requirements

In defining the access requirements to the PDA in Computer Aided Draughting and Design award, the objective was to ensure that no artificial barriers were created to prospective candidates. Access to the course will always be at the discretion of the delivering centre.

As a guide the following credentials are considered suitable access qualifications:

- ◆ possession of an NC in a related discipline eg Engineering, Architecture, Furniture design
- ◆ possession of a Higher in Graphic Communication (or equivalent)
- ◆ an HNC in a related discipline eg Engineering, Architecture
- ◆ CAD qualifications from other awarding bodies

- ◆ possession of a degree in a suitable discipline
- ◆ possession of relevant industrial experience
- ◆ completion of a suitable bridging course

Consideration must also be given to industry candidates who may not possess any of the above entry qualifications. Such candidates should be considered on their own merit, which can be gauged at an informal interview with the centre's course leader/tutor or admissions person. Indeed it is strongly recommended that ALL applicants be interviewed.

## 5 Structure

### 5.1 The framework

The proposed structure of the PDA in Computer Aided Draughting and Design award is outlined below:

#### Mandatory Units (4 credits)

| New Unit title    | Credit value | SCQF level | Comment |
|-------------------|--------------|------------|---------|
| CAD: 2D I         | 1            | 7          | DW1E 34 |
| CAD: 3D Modelling | 2            | 7          | DW13 34 |
| CAD: Principles   | 1            | 7          | DW16 34 |

#### Optional Units (2 credits from the following required)

|  |   |   |         |
|--|---|---|---------|
| CAD: Visualisation, Rendering and Presentation | 1 | 7 | DW18 34 |
| CAD: Feature Based Modelling 1                 | 1 | 7 | DW19 34 |
| CAD: Graphical Design                          | 1 | 7 | DW1C 34 |
| CAD: Architectural 1                           | 1 | 7 | DW1D 34 |
| CAD: 2D II                                     | 1 | 7 | DW12 34 |

### 5.2 The award

The PDA in Computer Aided Draughting and Design is awarded for the completion of:

- ◆ the mandatory Units totalling 4 credits
- and**
- ◆ any combination of optional Units totalling 2 credits

The PDA in Computer Aided Draughting and Design is awarded for **6 credits**.

### 5.3 Example course programmes

The award has the potential to attract a broad client group as outlined in Section 2. The flexibility offered by the framework allows the award to be tailor to meet the individual needs of each client group. Shown below is a sample of potential course programmes for some of these client groups. These programmes have been design to meet the needs of individual industries based on the comments and feedback during the consultation process.

#### 5.3.1 Course programme (Novice user)

The combination of Units in this programme reflects the range of skills and knowledge required to provide a novice user with a foundation in CADD. The programme may be:

| Unit sequence | Mandatory Units   | Credit value | Optional Units                 | Credit value |
|---------------|-------------------|--------------|--------------------------------|--------------|
| 1             | CAD: 2D I         | 1            | CAD: Graphical Design          | 1            |
| 2             | CAD: 3D Modelling | 2            | CAD: Feature Based Modelling 1 | 1            |
| 3             | CAD: Principles   | 1            |                                |              |

#### 5.3.2 Course Programme (Engineering)

From the feedback and recommendations from engineering organisations the inclusion of CAD: Principles is recognised as a fundamental element in this discipline. A perspective course for an engineering candidate may be:

| Unit sequence | Mandatory Units   | Credit value | Optional Units                 | Credit value |
|---------------|-------------------|--------------|--------------------------------|--------------|
| 1             | CAD: 2D I         | 1            | CAD: 2D II                     | 1            |
| 2             | CAD: 3D Modelling | 2            | CAD: Feature Based Modelling 1 | 1            |
| 3             | CAD: Principles   | 1            |                                |              |

Candidates that have already gained the HNC Unit DR1W 34 Engineering Drawing could have enough prior knowledge with respect to CAD: Principles to benefit from an alternative Unit.

### 5.3.3 Course Programme (Architectural)

The course framework for an Architectural bias may be:

| <b>Unit sequence</b> | <b>Mandatory Units</b> | <b>Credit value</b> | <b>Optional Units</b>                          | <b>Credit value</b> |
|----------------------|------------------------|---------------------|--|---------------------|
| <b>1</b>             | CAD: 2D I              | 1                   | CAD: Architectural 1                           | 1                   |
| <b>2</b>             | CAD: 3D Modelling      | 2                   | CAD: Visualisation, Rendering and Presentation | 1                   |
| <b>3</b>             | CAD: Principles        | 1                   |  |                     |

### 5.4 Progression

Candidates in possession of the PDA in CADD certificate will be able to progress to the HNC Computer Aided Draughting and Design, a copy of the framework is shown in Appendix 3.

## 5.5 Core Skills

The PDA Computer Aided Draughting and Design award has been designed using the new HN Design Principles and therefore the importance of Core Skills has been recognised and been incorporated, where appropriate, throughout the award. The following table is a summary of where there are opportunities to integrate the development of Core Skills.

| Unit title  | Communication |       |      | Numeracy     |                         | Information Technology       | Problem Solving |     |     | Working with Others |
|---|---------------|-------|------|--------------|-------------------------|------------------------------|-----------------|-----|-----|---------------------|
|   | Read          | Write | Oral | Using Number | Using Graphical Inform. | Using Information Technology | CT              | P&O | R&E | Working with Others |
| DW1E 34<br>CAD: 2D I                                      |               |       |      | √            |                         | √                            |                 |     |     |                     |
| DQ13 34<br>CAD: 3D Modelling                              |               |       |      |              | √                       |                              | √               | √   | √   |                     |
| DW18 34<br>CAD: Visualisation, Rendering and Presentation |               |       | √    |              |                         |                              |                 |     |     |                     |
| DW1D 34<br>CAD: Architectural I                           |               |       |      | √            | √                       |                              |                 |     |     |                     |
| DW1C 34<br>CAD: Graphical Design                          |               |       |      |              | √                       |                              |                 |     |     |                     |
| DW19 34<br>CAD: Feature Based Modelling I                 |               |       |      | √            | √                       |                              |                 |     |     |                     |
| DW12 34<br>CAD: 2D II                                     |               |       |      | √            |                         | √                            | √               | √   | √   |                     |
| DW16 34<br>CAD Principles                                 |               |       |      | √            | √                       | √                            | √               | √   | √   |                     |

As part of the HNC Computer Aided Draughting and Design Award individual Units were audited by a Core Skills Auditor from the SQA. The full breakdown of the Core Skills audit relevant to this PDA are contained in Appendix 4.

### 5.5.1 Core Skills Entry profile

The Core Skills recognised by SQA are at Levels Access 2 (SCQF level 2) to Higher (SCQF level 6).

The suggested Core Skills Entry profile for the PDA in Computer Aided Draughting and Design is as follows:

- ◆ Communication SCQF level 5
- ◆ Information Technology SCQF level 5
- ◆ Numeracy SCQF level 5
- ◆ Problem Solving SCQF level 5
- ◆ Working with Others SCQF level 4

### 5.5.2 Core Skills Exit profile

On successful completion of the award candidates may have had the opportunity to develop Core Skills at the following levels:

- ◆ Communication SCQF level 6
- ◆ Information Technology SCQF level 6
- ◆ Numeracy SCQF level 6
- ◆ Problem Solving SCQF level 6
- ◆ Working with Others SCQF level 6

Research for the PDA award indicates that employers and those in Higher Education consider that while advanced skills in technology will be fundamental to achievement, the analytical thinking, evaluation and reviewing of complex problem solving are naturally-occurring aspects of practical design activities. Similarly, sophisticated numerical and graphical competencies are a component of Computer Aided Draughting and Design. The framework of the award has been designed, therefore, to provide opportunities for developing and tailoring relevant elements of the Core Skills to the specific demands of the vocational area.

Opportunities for Core Skill elements are signposted on individual Unit descriptors and summarised in Appendix V for sample Unit Outcomes, although all Units offer opportunities for development of skills which are detailed in support notes. Awareness and development of Core Skills is further incorporated into the award by the requirement that candidates, supported by assessors, take responsibility for their individual learning, and communicate effectively, working co-operatively with a range of others.

## 6 Approaches to delivery and assessment

### 6.1 Content and context

The PDA in CADD has been designed to ensure candidates receive a thorough practical knowledge of the concepts that have evolved in CAD software application packages. As such, the predominant content of the Units in the course is the practical application of the CAD system. This must not preclude the theoretical aspects of the topic being assessed and it is recommended that the theory and practical elements be integrated when a new topic is being introduced.

The course is structured to allow candidates to progress their CAD skills, from basic 2D draughting to the more advanced topics such as Visualisation and Feature Based Modelling.

## **6.2 Delivery and assessment**

### **6.2.1 Delivery**

The PDA award can be delivered on a full-time, block-release, part-time day or part-time evening basis. Staff responsible for timetabling at individual centres should take account of the progressive nature of the award and timetable Units in a logical and sequential order. (Example course programmes and Unit sequence are shown in Section 5.3).

Lecturers may use a variety of teaching and learning approaches in delivering the Units in the PDA course. These may include lectures, demonstrations, projects/assignments, worked examples and candidate exercises. Industrial visits are encouraged to provide 'real-life' situations and guest speakers are recommended to demonstrate particular topics within the course. The use of design problems contextualised to candidates' individual industrial application is to be encouraged.

The use of open and distance learning material and on-line materials may help to supplement and support the learning that takes place in the classroom/CAD lab.

Lecturers should seek opportunities to allow candidates to develop their Core Skills within the Unit being delivered and such opportunities may include:

- ◆ allowing candidates opportunities to give full answers to questions
- ◆ correcting poor English in written responses
- ◆ allowing candidates to develop Communication skills in group work activities
- ◆ reinforcing Numeracy when delivering appropriate topics
- ◆ reinforcing Information Technology skills throughout the course
- ◆ developing problem solving skills by providing candidates with a range of increasingly difficult problems to solve
- ◆ developing team work and team leadership skills through group work

### **6.2.2 Assessment**

There should be an appropriate assessment strategy in place for the PDA award, and the following is recommended:

- ◆ the assessment load on candidates and staff is sensible and that assessment does not detract from teaching and learning
- ◆ a reliable verification procedure is put in place to ensure consistent national standards are achieved
- ◆ assessments should be contextualised and appropriate to a candidates' industry application
- ◆ it is recommended that all centres delivering the award refer to exemplar assessment material
- ◆ an holistic approach to assessment is recommended
- ◆ formative assessment could be used throughout the delivery of the Units to reinforce learning, build candidates' confidence and prepare candidates for summative assessment
- ◆ assessment on demand

Approved Prior Learning (APL) may be applicable to those candidates entering the course with prior CADD experience eg engineering draughtsperson. It is encouraged that where candidates can provide satisfactory evidence of knowledge and skills in line with the Unit standard APL should be given. In addition, assessment on demand may be an option that some experienced users may choose to take.

Assignments involving the integration of various Outcomes have been encouraged throughout the course. Cross Unit integration is also encouraged eg the 3D Modelling or Feature Based Modelling Units could be integrated with the Visualisation Unit, in that, the models created in either of the modelling Units could be used for Outcome 1 of the Visualisation Unit. CAD: 2D 1 focuses on learning 2D CAD skills eg how to create and edit geometry and could therefore be integrated with CAD: Principles which makes use of already owned 2D skills and focuses on ensuring a drawing is correctly laid out, dimensioned, annotated to a given standard, as used in industry.

The proposed PDA in CADD programme offers a number of opportunities to take an integrated approach to the generation of evidence to match the assessment process of the individual Units. A portfolio-based approach could help facilitate such integration eg 2D assessments could be developed into 3D and visualisation.

The table overleaf details a number of examples where integration of assessment may be achieved. Individual delivering centres are encouraged to integrate assessment where possible.

| <b>Examples of integration opportunities</b> |   |
|--|---|
| 1  | CAD: Visualisation Outcome 1 can be integrated with CAD: Feature Based Modelling I Outcomes 2 and 3. The models created for the Feature Based Modelling assessments can be used for Outcome 1 of the Visualisation Unit.  |
| 2  | CAD: Visualisation Outcome 1 can be partially integrated with CAD: 3D Modelling Outcomes 2 or 3. Additional models would need to be created to fully satisfy the requirements of Outcome 1 of the Visualisation Unit.   |
| 3  | CAD: 2D I can be fully integrated with CAD: Principles. One set of assessments could be used to satisfy both Units. However, it is stressed that the focus for the CAD: 2D I Unit is the learning of practical 2D CAD skills and familiarisation of the CAD system. This contrasts to the CAD: Principles Unit which focuses on setting and working to standards. |

Any extra time saved by integration of assessments could be spent on reinforcing Core Skill elements.

### **6.3 Open and Distance Learning**

The PDA in CADD course lends itself to flexibility of delivery therefore open and distance learning methods could easily be used for this award. This method may be preferable for many potential candidates such as those with unpredictable work commitments that would adversely affect attendance.

Where distance learning is the chosen method, the following methods of delivery can be employed to convey the information as required:

- ◆ printed tutorials could be posted
- ◆ electronic copy of the tutorials could be accessed via email or web.
- ◆ video tutorials accessed through a Virtual Learning Environment (VLE)

Checking the validity of the work submitted (ie who produced the work) of a distance candidate can be difficult to confirm. It is suggested that the candidate could be spoken to over the telephone by the lecturer, and when asked key questions about the assessments, the candidate will be able to communicate/confirm how the work was achieved. Printed hardcopies of assessment material could be posted where necessary. Where the candidates are assessed on oral presentation, the submission of a video recording of the presentation or group meeting is considered to be a satisfactory method of evidencing this type of element.

## 6.4 Candidates' information

### 6.4.1 General information

The PDA in Computer Aided Draughting and Design award has been designed by a team of CAD specialists drawing on input from Further Education, Higher Education, industry and Sector Skills Councils. The new qualification contains Units that utilise the full range of CAD technology from 2D to 3D including modelling and visualisation.

Within the award there is an opportunity for you to develop a comprehensive level of knowledge and practical skills in CADD as well as the more advanced features that have been developed in modern CAD software packages. You will also develop knowledge and understanding of the design process and the stages of design where CADD can help achieve a desirable design solution. The delivering centre should provide the opportunity for you to research CADD to gain an understanding of the industries in which CADD technology is being utilised.

### 6.4.2 Course content

The PDA in Computer Aided Draughting and Design is awarded for **6 credits**.

#### Mandatory Units (4 credits)

| New Unit title               | Credit value | SCQF level | Comment  |
|------------------------------|--------------|------------|--|
| DW1E 34<br>CAD: 2D I         | 1            | 7          | This Unit is develops the skills and knowledge required for the creation and manipulation of objects within a 2D CAD environment.                      |
| DW13 34<br>CAD: 3D Modelling | 2            | 7          | This Unit introduces candidates to computerised 3D modelling techniques.   |
| DW16 34<br>CAD: Principles   | 1            | 7          | This Unit provides candidates with the opportunity to develop the practical skills to produce drawings to current British and International Standards. |

### Optional Units (2 credits from the following required)

|   |   |   |  |
|---|---|---|--|
| DW18 34<br>CAD: Visualisation,<br>Rendering and<br>Presentation | 1 | 7 | This Unit introduces candidates to the processes and techniques utilised when creating 3D visualisations for presentation.   |
| DW19 34<br>CAD: Feature Based<br>Modelling 1                    | 1 | 7 | The Unit allows candidates to develop the knowledge and skills of feature-based (3D) modelling.  |
| DW1C 34<br>CAD: Graphical Design                                | 1 | 7 | This Unit introduces candidates to design-oriented software and enables them to develop graphical design techniques.   |
| DW1D 34<br>CAD: Architectural 1                                 | 1 | 7 | This Unit is designed to develop the skills and knowledge involved in 3D CAD modelling using an Architectural CAD package.   |
| DW12 34<br>CAD: 2D II   | 1 | 7 | This Unit is designed to further develop the skills and required for the creation and manipulation of objects within a 2D CAD environment building on those learned in CAD: 2D I |

#### 6.4.3 Entry criteria

As a guide the following are considered suitable access qualifications:

- ◆ possession of an NC in a related discipline eg Engineering, Architecture, Furniture design.
- ◆ possession of a Higher in Graphic Communication (or equivalent)
- ◆ an HNC in a related discipline eg Engineering, Architecture
- ◆ CAD qualifications from other awarding bodies
- ◆ possession of a degree in a suitable discipline
- ◆ possession of relevant industrial experience
- ◆ completion of a suitable bridging course

Consideration will also be given to industry candidates who may not possess any of the above entry qualifications. Access to the course will always be at the discretion of the delivering centre.

#### 6.4.4 Assessment methods

The assessments for the award meet national standards as well as reflecting industry practice. The assessment schedule for the award is optimised to allow adequate time for you to learn the essential knowledge and skills of Computer Aided Draughting and Design that are required for industry practice.

Assessment will be carried out at individual Unit level. Individual assessment for Units will be in the form of practical and/or written tests. At the start of each Unit the assessing centre should inform you of the format for assessment.

Centres should provide you with a brief summary of the Group Award before you start your course of study. It should include information on what the award is about, provide information on the knowledge and skills to be developed, what is involved in assessment with particular reference to the conditions of the award. This would normally be presented in a course handbook and should also include information on the possible route(s) of progression in education and types of employment available for candidates obtaining the qualification.

#### **6.4.5 Progression**

An important aim of this award is to enable candidates to progress to further academic and/or professional qualifications. The qualification has been designed to provide candidates with the relevant mix of competencies to enable career progression whilst at the same time allowing candidates an articulation route to the HNC in Computer Aided Draughting and Design.

The PDA is designed as a part of the HNC award and all credits completed in this PDA are included in the HNC CADD framework. Candidates could progress to the HNC requiring only 6 further credits from the mandatory Units of the HNC framework.

## **7 Appendices**

|            |  |
|------------|--|
| Appendix 1 | Industry/FE questionnaires                         |
| Appendix 2 | Labour Market Intelligence sourced from SEMTA      |
| Appendix 3 | HNC Computer Aided Draughting and Design Framework |
| Appendix 4 | SEMTA Mapping                                      |
| Appendix 5 | Unit Grid Core Skills                              |
| Appendix 6 | Unit Specifications                                |

## **Appendix 1: Industry/FE Questionnaire (Responses)**

## Industry/FE response

The initial research was carried out as part of the original design process. The industrial and FE questionnaire invited comments on employment opportunities and the proposed course structure. Overall the results show that both industry and FE supported the introduction of a PDA in CADD.

The feedback on the mandatory and optional content of the framework gave a divided response with respect to the specific content and the needs of individual industries. However, two thirds of respondents supported the proposed framework with the remaining third asking to revise or include specific Units or skills that would enhance employment opportunities. The majority of comments from FE supported the proposed framework with commentary supporting the flexibility offered. The flexibility of the framework allows centres to tailor programmes to match their client base.

Following comments and observations from the validation panel a second questionnaire was circulated to ask for additional clarification on two specific issues. The first recommendation surrounded the relevance of 'Design' in the title of the award Computer Aided Draughting and Design. Feedback on this point reflected the discussions of the validation panel with a range of support both for and against inclusion. The predominant view however was in support of the use of 'Design' in the title with various comments highlighting the 'pivotal role' design has in a range of disciplines within CADD.

The second recommendation was to include the Unit CAD: Principles as a mandatory Unit rather than an option. As with the first recommendation feedback was divided but the majority view was that the Unit CAD: Principles was important for novice and engineering candidates but that it wasn't mandatory for those with for example an architectural bias. Comments also spoke against the increase of the mandatory section to four credits citing the loss of flexibility as the main criticism. This feedback demonstrates the need to provide a flexible award while at the same time providing clear recommendations on course content for a range of key client groups. In order to provide clear guidance sample course programmes have been provided in section 5.3 that incorporates the feedback on these issues.

## **RE: PDA in CAD(D) Validation**

### **Recommendation 1**

There was significant discussion around the title of the award, PDA in Computer Aided Draughting and Design, regarding the significance of 'Design' in the title. It would be valuable if you could respond to the questions below:

- ◆ Does the existing title fit with a portfolio of courses HNC CADD and HND CADD?
- ◆ YES
- ◆ Does the amount of design contained in the award justify inclusion of design in the existing title?
- ◆ YES
- ◆ Would the existing title be misleading to candidates and/or employers alike?
- ◆ NO
- ◆ If the title stays as PDA in CADD should a more obvious 'design' Unit be added to the core Mandatory Units (please consider the effect including the second recommendation)?
- ◆ Not required as 3D modelling provides scope and requirement for design. Assessment task and formative work could reflect a clear design activity.
- ◆ Would a change in the title to PDA in Computer Aided Draughting more accurately reflect the award?
- ◆ NO
- ◆ Any other comments?

### **Recommendation 2**

The validation panel recommended that the Unit *CAD: Principles* should be added to the Mandatory Section. This recommendation would change the award framework to four mandatory and two optional Units as shown below, rather than the three Units in each as originally proposed.

- ◆ What is your opinion to the addition of this Unit to the mandatory section?
- ◆ This is a PDA and candidates should be allowed maximum choice to suit their personal needs.
- ◆ Guidance could be offered by the College as to which options may be more beneficial.
- ◆ Is the increase to four mandatory Units worth the reduction in flexibility of the award?
- ◆ NO
- ◆ Any other comments?

Regards,

John Hill

**RE: PDA in CAD(D) Validation**

I have no problem with the title including design. I would recommend that the options section be increased to allow for centres to tailor their selection to reflect more of a design element if they desire.

Increasing the mandatory section to four is a backward step both from a course rationale perspective and flexibility. PDAs were introduced into the engineering sector predominately for employed candidates who wanted professional development within shorter timescales whilst working. Centres want the flexibility of course delivery.

The team needs to reflect on a course that is being designed with the above rationale with now over 60% as mandatory.

Hope this helps

Dave Watson  
Assistant Head of Faculty (Advanced Engineering)  
Faculty of Engineering and Science  
Kilmarnock College

## **RE: PDA in CAD(D) Validation**

### **Recommendation 1**

There was significant discussion around the title of the award, PDA in Computer Aided Draughting and Design, regarding the significance of 'Design' in the title. It would be valuable if you could respond to the questions below.

- ◆ Does the existing title fit with a portfolio of courses HNC CADD and HND CADD?
- ◆ The title of PDA CADD completes a logical suite of qualifications.
- ◆ Does the amount of design contained in the award justify inclusion of design in the existing title?
- ◆ Clearly the design content is minimal depending on Units selected and application, however, I think that since some of the Units contained within the award can be used for design calling it CADD would attract a wider group. This would be an ideal stepping stone for a student who wanted to learn the basics of design.
- ◆ Would the existing title be misleading to candidates and/or employers alike?
- ◆ No, on the contrary anyone using a search engine and are interested in draughting or design would find this PDA if it is called CADD. I would also suggest that both candidates and employers would go deeper than the title to ascertain the suitability of an award.
- ◆ If the title stays as PDA in CADD should a more obvious 'design' Unit be added to the core Mandatory Units (please consider the effect including the second recommendation)?
- ◆ While I would not be against adding a more obvious design Unit (this would have to be a fairly generic Unit and not just engineering orientated) I feel that there is sufficient design included in the PDA in CADD as an introduction to the topic.
- ◆ Would a change in the title to PDA in Computer Aided Draughting more accurately reflect the award?
- ◆ I do not think so, and an opportunity to have an award that at least acts as an introduction to design would be lost.

### **Recommendation 2**

The validation panel recommended that the Unit CAD: Principles should be added to the core Mandatory Units. This recommendation would change the award framework to four mandatory and two optional Units as shown below, rather than the three Units in each as originally proposed.

- ◆ What is your opinion to the addition of this Unit to the mandatory section?
- ◆ While adding principles to the mandatory section would be biased towards the engineering sector, I consider it important and logical for principles to be mandatory. It would certainly be advantageous to the candidate who progresses to the HNC in CADD as this Unit would already have been achieved. (Principles being a mandatory Unit in the HNC).
- ◆ Is the increase to four mandatory Units worth the reduction in flexibility of the award?
- ◆ I feel that the reduction in flexibility is justified in allowing the candidate to learn important details in drawing practice.

Douglas Tod  
Sector Skills Advisor  
UK Policy, SEMTA

## **RE: PDA in CAD(D) Validation**

Please find my comments below.

- ◆ Does the existing title fit with a portfolio of courses HNC CADD and HND CADD?
- ◆ Yes
- ◆ Does the amount of design contained in the award justify inclusion of design in the existing title?
- ◆ There are no real design principles, therefore the answer would have to be No.
- ◆ Would the existing title be misleading to candidates and/or employers alike?
- ◆ Yes for the reason above.
- ◆ If the title stays as PDA in CADD should a more obvious 'design' Unit be added to the core Mandatory Units (please consider the effect including the second recommendation)?
- ◆ Yes
- ◆ Would a change in the title to PDA in Computer Aided Draughting more accurately reflect the award?
- ◆ Yes
- ◆ Any other comments?
- ◆ PDA in Computer Aided Draughting is a more accurate a title for Proposal 1

### **Recommendation 2**

The validation panel recommended that the Unit CAD: Principles should be added to the core Mandatory Units. This recommendation would change the award framework to four mandatory and two optional Units as shown below, rather than the three Units in each as originally proposed.

- ◆ What is your opinion to the addition of this Unit to the mandatory section?
- ◆ The Unit would ensure a depth of skill/knowledge in the area of general 2D draughting.
- ◆ Is the increase to four mandatory Units worth the reduction in flexibility of the award?
- ◆ Absolutely
- ◆ Any other comments?

Regards

Richard (McKay)  
Department of Engineering  
Reid Kerr College

**RE: PDA in CAD(D) Validation**

With regards to the points raised the only reason for the Design part of the award was to keep all the awards in the same title profile, if it would be easier to drop it for the PDA I would not be to concerned.

With regards to the points raised in the second recommendations, I would advocate for the flexibility to be retained, leave it at three core and three optional Units. My reasoning for this is that the whole ethos of the award is to attract people form industry to gain an award within the discipline that they are working, therefore the choice of option would be to suit their particular discipline.

I hope that this helps you somewhat.

Kind regards  
Ian (Ian.Russell@forthvalley.ac.uk)

## **RE: PDA in CAD(D) Validation**

Hi Alistair,

### **Recommendation 1**

I think the title of the award has to be CADD. Although there is no outright 'design' Unit, the award is centred around software packages that have a pivotal role in the design stage in any discipline. Any assessments could easily be written to allow the candidate to design a component for use within their chosen discipline.

To fit within the current portfolio, I the award is more recognisable if titled CADD to fit with the HNC CADD and proposed HND CADD.

### **Recommendation 2**

I think including CAD: Principles in the mandatory section of the award may limit the award to Engineering disciplines. Architectural, civil engineering, electrical drawings etc. have somewhat different drawing practices from the requirements placed upon Engineering drawings. Although this Unit introduces candidates to the elements required on drawings and how they should be presented, anyone wishing to further their career might find it difficult to justify if not in this discipline.

I don't believe the proposed award is as flexible as it could be, the very nature of the HNC CADD course is to remain generic, the proposed 4 mandatory Units removes this ability to suit a wide range of disciplines.

Michael

Michael McGuire  
Distance CADD Co-ordinator  
Motherwell College  
Dalzell Drive  
Motherwell  
ML1 2DD

**Scottish Qualifications Authority  
Employers' Questionnaire on the new  
PDA in Computer Aided Draughting & Design Award**

**Name of Company:** \_\_\_\_\_

**Contact Name:** \_\_\_\_\_

**e-mail address:** \_\_\_\_\_ **phone no:** \_\_\_\_\_

**Nature of Company's Business:** \_\_\_\_\_

**Company Size (number of persons employed at site):** \_\_\_\_\_

Please take a few minutes to study the attached draft PDA Framework and then answer the following questions:

***Employment Opportunities***

**Yes      No**

*Q1    Would your company consider employing someone with the new PDA in Computer Aided Draughting & Design?*

    

*Q2    If you answered, Yes, to Q.1 in what capacity would your company employ such a person?*

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

***Mandatory Section***

The Units in the Mandatory section of the PDA are included to allow candidates to develop a knowledge and understanding of core computer aided draughting and design principles and technologies at Higher National level.

**Yes      No**

*Q3    Do you agree with the choice of Units in the Mandatory section of the PDA?*

    

*Q4    If you answered, No, to Q3 please indicate what changes you would like to see to the Mandatory section of the PDA.*

|   |
|---|
| Comments on changes to the Mandatory section of the PDA |
|---|

### **Optional section**

This section of the award gives candidates the opportunity to choose the subject area best suited to their current employment needs and future career/educational developments. The candidate must choose 3 credits from the optional section.

**Yes**      **No**

*Q5 Do you agree with the choice of Units offered in this section?*           

*Q6 If you answered No to Q5 comment on the changes you would like to see to the Optional Section of the PDA.*

**Comment on the changes you would like to see to the Optional section of the PDA**

***Thank you for taking the time to complete this questionnaire.***

## **Appendix 2: Labour Market Intelligence sourced from SEMTA report**

The following information is extracted from the Sector Skills Council for Science, Engineering and Manufacturing Technologies (SEMTA) Labour Market Survey 2002.

The report detailed that 72% of electronics employers with skills gaps felt they had technical engineering skills gaps and this was particularly important for managers, professional engineers and technicians. Skills gaps for operators, sales/customer service staff and technicians would have the most significant impact on employers. The most important technical skills gaps were for general engineering skills, electrical/electronics skills, Computer Numerical Control (CNC) machine operations, assembly line/production robotics and Computer Aided Design (CAD). The main business impacts of these skill gaps were: increased operating costs; difficulties meeting customer service objectives; difficulties introducing new working practices and delays in developing new products or services.

Aerospace companies in Scotland (33%) were most affected by skills gaps. Skills gaps were mostly found at management, professional, craft and operator/assembler levels. Skills gaps for technical engineering skills (75%) were the most significant, particularly for general engineering skills, CNC machine operations, Computer Aided Design (CAD) and Computer Aided Manufacture (CAM).

The automotive sector also shows significant technical engineering skills gaps.

Overall employers with technical engineering skills gaps (75%) identify the most significant, particularly for general engineering skills, CNC machine operations, Computer Aided Design (CAD) and Computer Aided Manufacture (CAM).

The SEMTA employer survey of workforce development activity that covered the types of training bought by employers, showed that in the previous 12 months training had been provided in I-deas and Catia, Pro-E and AutoCAD, all CAD/CAM packages that are used particularly in aerospace and vehicle design and for passing design data to CNC machines in vehicle component manufacture.

Training organisations (44%) have demand for courses that they cannot provide. IT specialist courses feature strongly in this demand, including CAD, CAM, 3D modelling and CNC programming. The report identifies an insufficient supply of specialist IT provision including, CAD, CAM and 3D modelling.

## **PDA — CADD**

On behalf of SEMTA, the Sector Skills Council for Science and Engineering Technologies, I confirm our support for the proposed Professional Development Award in CADD. Research carried out for Sector Skills Agreements clearly show that employers want small qualifications that are skills specific. It is our opinion that this award will be a valued addition to those currently available especially as a stage towards the HNC in CADD. Once validated the PDA in CADD will be added to the qualifications currently available in the Modern Apprenticeship Engineering Framework.

Yours

Sincerely  
Douglas

Douglas Tod  
Sector Skills Advisor  
UK Policy, SEMTA

## **Appendix 3: HNC Computer Aided Draughting and Design Framework and Unit Descriptors**

## HNC Framework (G868 15)

The structure of the HNC Computer Aided Draughting and Design award is outlined below:

### Mandatory Units (9 credits)

| Unit title                      | Code    | SCQF credit points | SCQF level | SQA credit value |
|---------------------------------|---------|--------------------|------------|------------------|
| Communication: Practical Skills | D77G 34 | 8                  | 7          | 1                |
| CAD: 2D I                       | DW1E 34 | 8                  | 7          | 1                |
| CAD: 2D II                      | DW12 34 | 8                  | 7          | 1                |
| CAD: 3D Modelling               | DW13 34 | 16                 | 7          | 2                |
| CAD: User Systems               | DW14 34 | 8                  | 7          | 1                |
| CAD: Principles                 | DW16 34 | 8                  | 7          | 1                |
| Design Methodology              | DW17 34 | 8                  | 7          | 1                |
| Graded Unit                     | DW15 34 | 8                  | 7          | 1                |

### Optional Units (3 credits from the following required)

|  | Code    | SCQF credit | SCQF level | credit value |
|--|---------|-------------|------------|--------------|
| CAD: Visualisation, Rendering and Presentation   | DW18 34 | 8           | 7          | 1            |
| CAD: Feature Based Modelling 1                   | DW19 34 | 8           | 7          | 1            |
| CAD: Systems Management                          | DW1A 35 | 16          | 8          | 2            |
| CAD: Graphical Design                            | DW1C 34 | 8           | 7          | 1            |
| CAD: Architectural 1                             | DW1D 34 | 8           | 7          | 1            |
| Design for Manufacture                           | DR3M 35 | 8           | 8          | 1            |
| Computer Aided Engineering (CAE) and Prototyping | DR1R 35 | 16          | 8          | 2            |

The purpose of the Graded Unit is to assess the candidates' ability to integrate and apply the knowledge and/or skills gained in individual Units contained within the mandatory section of the HNC CADD framework. The assessment for candidates sitting the HNC Graded Unit will be in the form of a project.

## **Appendix 4: SEMTA Mapping**

The SQA Unit CAD: Principles is the one SQA Unit that could be mapped against seven out of the eight SEMTA Units. However, it is considered highly unlikely that all of the seven SEMTA Units be covered using the CAD: Principles Unit. Candidates on the PDA CADD course could cover a broad variety of different drawing types while working through the content of the CAD: Principles Unit. In particular, Outcome 4 of the CAD: Principles Unit could include learning and teaching in; Electrical Engineering drawings (SEMTA Unit: 6); Electronic Engineering drawings (SEMTA Unit: 7); Fluid Power Engineering drawings (SEMTA Unit: 6); Systems/Services Engineering Drawings (SEMTA Unit: 6). However, candidates will only be assessed on one of the listed topics, this being at the discretion of the delivering centre.

A full breakdown of the mapping of the SQA Units to SEMTA Occupational Standards is contained in the following grid.

| <b>SEMTA Occupational Standards Unit</b>  | <b>Relevant SQA Units</b>  | <b>Notes</b>   |
|---|--|--|
| Unit No 4: Producing Mechanical Engineering Drawings using Computer Aided Techniques              | CAD: Principles CAD:2D I CAD:2D II CAD:3D Modelling CAD: Feature Based Modelling | All aspects of SEMTA Unit No: 4 could be covered when delivering SQA Unit CAD: Principles.   |
| Unit No 5: Producing Engineering Drawings/Models using 3D Computer Aided Techniques               | CAD:3D Modelling CAD: Feature Based Modelling                                    | All aspects of SEMTA Unit No: 5 could be covered when delivering SQA Unit CAD:3D Modelling. Partial coverage could be achieved through delivery of CAD: Feature Based Modelling.   |
| Unit No 6: Producing Electrical Engineering Drawings using Computer Aided Techniques              | CAD: Principles CAD:2D I CAD:2D II CAD:3D Modelling CAD: Feature Based Modelling | All aspects of this SEMTA Unit No: 6 could be covered when delivering SQA Unit CAD: Principles (mainly Outcome 4). The PDA CADD framework contains SQA Units, which when taught collectively, could provide opportunity to develop skills and knowledge towards the occupational standard. (See list)  |
| Unit No 7: Producing Electronic Engineering Drawings using Computer Aided Techniques              | CAD: Principles CAD:2D I CAD:2D II CAD:3D Modelling CAD: Feature Based Modelling | All aspects of this SEMTA Unit No: 7 could be covered when delivering SQA Unit CAD: Principles (mainly Outcome 4). The PDA CADD framework contains SQA Units, which when taught collectively, could provide opportunity to develop skills and knowledge towards the occupational standard. (See list)  |
| Unit No 8: Producing Fabrication/Engineering Engineering Drawings using Computer Aided techniques | CAD: Principles CAD:2D I CAD:2D II CAD:3D Modelling CAD: Feature Based Modelling | All aspects of this SEMTA Unit No: 8 could be covered when delivering SQA Unit CAD: Principles (mainly Outcome 4). The PDA CADD framework contains SQA Units, which when taught collectively, could provide opportunity to develop skills and knowledge towards the occupational standard. (See list)  |
| Unit No 9: Producing Fluid Power Engineering Drawings using Computer Aided techniques             | CAD: Principles CAD:2D I CAD:2D II CAD:3D Modelling CAD: Feature Based Modelling | All aspects of this SEMTA Unit No: 9 could be covered when delivering SQA Unit CAD: Principles (mainly Outcome 4). The PDA CADD framework contains SQA Units, which when taught collectively, could provide opportunity to develop skills and knowledge towards the occupational standard. (See list)  |
| Unit No 10: Producing Engineering Systems/Services Drawings using Computer Aided techniques       | CAD: Principles CAD:2D I CAD:2D II CAD:3D Modelling CAD: Feature Based Modelling | All aspects of this SEMTA Unit No: 10 could be covered when delivering SQA Unit CAD: Principles (mainly Outcome 4). The PDA CADD framework contains SQA Units, which when taught collectively, could provide opportunity to develop skills and knowledge towards the occupational standard. (See list) |

## **Appendix 5: Unit Grid Core Skills**

## Oral Communication

### Produce and respond to oral Communication on a complex topic

- a Use vocabulary and a range of spoken language structures consistently and effectively with appropriate formality.
- b Convey all essential ideas/information/opinions accurately and coherently with appropriate varied emphasis.
- c Structure to take full account of purpose and audience.
- d Take account of situation and audience during delivery.
- e Respond to others taking account of their contribution.

| Unit   | Knowledge/Skills/Evidence  | a | b | c | d | e |
|--|--|---|---|---|---|---|
| CAD: Visualisation, Rendering and Presentation   | Assessed: Outcome 3 — Design and production of materials for formal oral presentation. | √ | √ | √ | √ | √ |
| <p><b>Group working across the award will reflect industry practice with discussion of theoretical and practical issues as standard. Personal interviews and guidance from assessors will additionally support candidates in verbal exploration of complex issues and problem solving approaches. Teaching and Learning for all Units will involve on-going discussion analysing and evaluating facts and opinions on best practice.</b></p> |  |   |   |   |   |   |

## Using Information Technology (SCQF level 6)

### Use an IT system independently to process a range of information

- a Use a range of it equipment paying attention to security and other users.
- b Resolve a simple hardware or software problem.
- c Use software in an unfamiliar context requiring analysis, design, integration of data, decision on format.
- d Carry out searches to extract and present information from electronic sources.

| Unit   | Knowledge/Skills/Evidence   | a | b | c | d |
|--|---|---|---|---|---|
| CAD: Principles  | Creation of diagrams applying CAD principles.   | √ | √ | √ | √ |
| CAD: 2D 2  | Create, save and print orthographic drawings to a specified remit.  | √ | √ | √ | √ |
| CAD: Architectural 1   | Graphical evidence in the form of CAD application template and drawing files presented on a disk with additional printed copies of finished drawings. | √ | √ | √ | √ |
| <p><b>An advanced level of knowledge, understanding and practical skill in the range of uses and applications of Technology in Design and Draughting underpins all work undertaken by candidates.</b></p> <p><b>Security, consideration and the managing of any technical problems will be a routine aspect of all practical activities.</b></p> |   |   |   |   |   |

## Numeracy (SCQF level 6)

### Skill component -Using Number

#### Apply a wide range of numerical skills

- a Work confidently with a numerical or statistical concept.
- b Decide on steps and operations to be carried out.
- c Carry out a number of sustained complex calculations.

| Unit  | Knowledge/Skills/Evidence   | a | b | c |
|---|---|---|---|---|
| CAD: Principles   | Underpinning knowledge for the Unit requires knowledge and practical application of design principles -understanding of dimensions, tolerances and constraints is assessed.     | √ | √ | √ |
| CAD: 2D 2   | The interpretation, creation and production of a 2D design concept involves a number of stages in complex and sustained calculations.   | √ | √ | √ |
| CAD: Architectural 1  | Outcomes 1–4 —The production of detailed floor plans scaled to a given specification. Sustained complex calculations for working and detail drawings interpreting client brief. | √ | √ | √ |
| <p><b>Theoretical and underpinning knowledge for all Units requires an in depth understanding of numerical concepts and a facility to undertake sustained and complex calculations in contexts where interpretation and checking of information is essential to accurate working. Candidates will routinely demonstrate practical understanding of such concepts as relationships in symbolic form as they undertake and refine the design process.</b></p> |   |   |   |   |

## Numeracy (SCQF level 6)

### Skill component — Using graphical information

#### Apply a wide range of graphical skills in everyday and generalised contexts

- a Analyse and interpret significant features of graphical information in relation to the underlying variables.
- b Select appropriate forms — tables, graphs, charts, diagrams or qualitative form — to communicate information.

| Unit   | Knowledge/Skills/Evidence  | a | b |
|--|--|---|---|
| CAD: Principles  | Theoretical and underpinning knowledge for the Unit requires understanding and practical application of concepts of orthographic projection, dimension.  | √ | √ |
| CAD: Architectural 1   | Analysis and interpretation of a given specification and producing appropriately annotated working and detail drawings of floor plans  | √ | √ |
| CAD: 3D Modelling  | Application of computerised modelling techniques to an industrial context, interpreting and working with linear, circular and angular dimensions.  | √ | √ |
| CAD: Graphical Design  | Analysis of requirements of brief. Understanding and application of vector graphics, bit-mapped graphics, computer graphic effects in the production of an effective creative design solution. | √ | √ |
| Theoretical and underpinning knowledge for all Units requires an understanding of numerical concepts, an ability to interpret and present information in graphic form for maximum effect and impact, to interpret and use standard symbols and annotations and to interpret and present graphic information to a required specification. |  |   |   |

## Problem Solving (SCQF Level 6)

### Skill components

#### Critical Thinking

- ◆ Analyse a complex situation or issue

#### Planning and Organising

- ◆ Plan organise and complete a complex task

#### Reviewing and Evaluating

- ◆ Review and evaluate a complex problem solving activity

| Unit   | Knowledge/Skills/Evidence   | CT | PO | RE |
|--|---|----|----|----|
| CAD: Principles  | Analysis of requirements, identifying and allocating appropriate resources to produce single part and assembly drawings and a block or circuit diagram.                                     | √  | √  | √  |
| CAD: 2D 2  | Design, creation and printing a 2D Orthographic drawing to a given specification using externally referenced parts using the CAD package.   | √  | √  | √  |
| CAD: 3D Modelling  | Creation of a conceptual model, developed with addition of detail to a 3D multi level structure, to a given specification. Evaluation of advantages and disadvantages of 3D surface models. | √  | √  | √  |
| <p><b>All elements of the Core Skill will be critical to the award in which all Units require an analytical and evaluative approach to problem solving. Interpretation of a brief, strategic planning and implementation of a range of approaches to practical design and draughting tasks requires sophisticated analytical and creative skills. Evaluation and modification of designs to meet identified objectives as appropriate will be integral to achievement.</b></p> |   |    |    |    |