



## **Arrangements for**

**Professional Development Award in Engineering  
Practice: Fabrication and Welding at SCQF level 7;  
(Group Award Code — G9MT 47)**

**Professional Development Award in Engineering  
Practice: Engineering Manufacture at SCQF level 7;  
(Group Award Code — G9MP 47)**

**Professional Development Award in Engineering  
Practice: Engineering Maintenance at SCQF level 7;  
(Group Award Code — G9MV 47)**

**Professional Development Award in Engineering  
Practice: Electrical Engineering at SCQF level 7;  
(Group Award Code — G9MR 47)**

**and**

**HNC Engineering Practice  
(Group Award Code — G86L 15)**

**Date of Validation Meeting: February 2010**

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## **Acknowledgement**

SQA acknowledges the valuable contribution that Scotland's colleges have made to the development of Professional Development Awards.

## History of Changes

It is anticipated that changes will take place during the life of the qualification and this section will record these changes. This document is the latest version and incorporates the changes summarised below. Centres are advised to check SQA's APS Navigator to confirm they are using the up to date qualification structure.

**NOTE:** Where a Unit is revised by another Unit:

- ◆ No new centres may be approved to offer the Unit which has been revised.
- ◆ Centres should only enter candidates for the Unit which has been revised where they are expected to complete the Unit before its finish date.

Version number	Description	Date
04	Production Planning and Control from DT63 35 (lapse date 31/07/2012, finish date 31/07/2014) to H1KS 35 for the following group awards: G86L 15  Revision of Unit: DE1K 33 Workplace Communication in English has been revised by H8T2 33 and finishes on 31/07/2016.	07/05/15
03	Addition of Credit Transfer Table <i>see Page 29</i> .	15/01/15
02	<b>Revision of Units:</b> D77G 34 Communication: Practical Skills revised by H7MB 34. DG4H 33 Mathematics for Engineering 1: Electronics and Electrical revised by H7K0 33 Engineering Mathematics 1. DT5X 33 Mathematics for Engineering 1: Mechanical and Manufacturing revised by H7K0 33 Engineering Mathematics 1 on <b>HNC Engineering Practice</b> framework finishing 31/07/2016.	22/10/14

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## **Important Note**

Where the term Advanced Certificate/HNC Engineering Practice is used throughout this document it should generally be understood to mean Advanced Certificate in Fabrication and Welding/Advanced Certificate in Engineering Manufacture/Advanced Certificate in Engineering Maintenance/Advanced Certificate in Electrical Engineering/HNC Engineering Practice.

Where the term PDA/HNC Engineering Practice is used throughout this document it should generally be understood to mean PDA in Engineering Practice: Fabrication and Welding at SCQF level 7/PDA in Engineering Practice: Engineering Manufacture at SCQF level 7/PDA in Engineering Practice: Engineering Maintenance at SCQF level 7/PDA in Engineering Practice: Electrical Engineering at SCQF level 7/HNC Engineering Practice.

# 1 Introduction

This is the Arrangements Document for the following awards:

PDA\* in Engineering Practice: Fabrication and Welding at SCQF level 7;  
PDA in Engineering Practice: Engineering Manufacture at SCQF level 7;  
PDA in Engineering Practice: Engineering Maintenance at SCQF level 7;  
PDA in Engineering Practice: Electrical Engineering at SCQF level 7;  
HNC Engineering Practice.

\*PDA stands for Professional Development Award.

The four PDAs were validated in February 2010 while the HNC Engineering Practice was validated in February 2006

This document includes: background information on the development of the Group Award, its aims, guidance on access, details of the Group Award structure and guidance on delivery and assessment.

The four Advanced Certificates in Fabrication and Welding, Engineering Manufacture, Engineering Maintenance and Electrical Engineering together with an HNC Engineering Practice were successfully validated in February 2006. Since that date SQA has revised its Design Principles for Professional Development Awards which span the range SCQF levels 6 to 12. As SQA is phasing out the Advanced Certificate qualification and as the Advanced Certificates mentioned earlier in this paragraph fit neatly into the PDA Design Principles it was considered appropriate to convert the Advanced Certificates into PDAs. In undertaking this task no change has been made to the structure and content of the original four Advanced Certificates or the HNC Engineering Practice. The only significant change in this document from the original Advanced Certificate/HNC Engineering Practice Arrangements Document is a change in name from Advanced Certificate to Professional Development Award together with recognition of the level of the four PDAs as SCQF level 7. Thus, much of this current Arrangements Document remains the same as that produced for the previous Advanced Certificates/HNC Engineering Practice Arrangements Document in 2006. However, justification is included in this updated Arrangements Document on the ways in which converting the four Advanced Certificates into PDAs meets the Design Principles for PDAs at SCQF levels 7–12. Furthermore, since 2006 SQA has also introduced a range of new National Certificates in Engineering and reference to these in terms of the way they provide access to the four PDA/HNC Engineering Practice awards is made in the Access to the Awards section of this document.

## 2 Rationale for the revision of the awards

### 2.1 Group Award Titles

The PDA/HNC Engineering Practice awards will form part of the SQA suite of HN Engineering awards which were redeveloped as part of the implementation of the new SQA HN Design Principles. The PDA/HNC Engineering Practice awards are designed for those candidates who are employed, or who wish to gain employment, as advanced engineering craft persons and supervisors within an engineering environment. They, thus, occupy a unique position in the current suite of HN Engineering qualifications in that all other Engineering awards are geared more to the education and training of engineering technicians and incorporated engineers.

In undertaking the review of the Advanced Certificates/HNC Engineering Practice awards (now re-titled PDA/HNC Engineering Practice) in 2005-06 the QDT (Qualification Design Team) considered carefully the structure and titles of the previous awards. The QDT essentially retained the structure of the previous awards (ie 6-credits for an Advanced Certificate and a further 6-credits for an HNC Engineering Practice). However, the QDT made certain modifications to the titles of some of the previous awards to clarify the purpose and content of the awards. Details of changes to the awards with an explanation for the reasons for the change are shown in the table below.

Existing Title of Award	New Title of Award	Comments
Advanced Certificate in Engineering Practice: Fabrication and Welding	Advanced Certificate in Fabrication and Welding (now <i>re-titled PDA in Engineering Practice: Fabrication and Welding at SCQF level 7</i> )	
Advanced Certificate in Engineering Practice: Manufacture and Engineering Support	Advanced Certificate in Engineering Manufacture ( <i>re-titled PDA in Engineering Practice: Engineering Manufacture at SCQF level 7</i> )  and  Advanced Certificate in Engineering Maintenance ( <i>re-titled PDA in Engineering Practice: Engineering Maintenance at SCQF level 7</i> )	Manufacture and Engineering Support separated into two distinct awards as candidates tend to study one or other of these subject areas.  Title Engineering Support replaced by Engineering Maintenance as this title more accurately reflects what the award is about and is more clearly understood by stakeholders of the award.

Existing Title of Award	New Title of Award	Comments
Advanced Certificate in Engineering Practice: Electromechanical	Advanced Certificate in Electrical Engineering <i>(re-titled PDA in Engineering Practice: Electrical Engineering at SCQF level 7)</i>	Title changed to reflect that the new award's primary focus is on Electrical Engineering subjects. Stakeholders had difficulty understanding the Electromechanical title which may explain this award's low uptake in terms of candidate entries. The new award title is easier to understand and generally more recognised by stakeholders of craft awards.
HNC Engineering Practice	HNC Engineering Practice <i>(No title change)</i>	No change to title. Title generally understood and respected by stakeholders.

## 2.2 History and Market Research to support the PDA/HNC Engineering Practice

### 2.2.1 History

SCOTVEC first introduced an Advanced Certificate/HNC Engineering Practice award structure in 1996 as part of a major national development of HN Engineering awards which saw the introduction of an overarching HN Engineering Framework. In 2006 the SQA introduced a revised Advanced Certificate/HNC Engineering Practice award structure which took account of the new SQA, HN Design Principles and the latest developments in technology, working and supervisory practices and education. The latest development in 2010 has simply resulted in a change of title of the four Advanced Certificates to PDAs and a recognition that the four PDAs are at SCQF level 7.

### 2.2.2 Market Research

Most of the market research for the PDA/HNC Engineering Practice awards was undertaken in 2005-06 when the revised Advanced Certificate/HNC Engineering Practice awards were developed. However, opportunities were taken when producing the PDA/HNC Engineering Practice Validation Document to update some of the desk based market research with a view to lending further support to the development of the four PDAs and the HNC Engineering Practice awards. A brief outline of the market research methods used in 2005–2006 and 2009 to support award developments are summarised in Table 2.2.



**Table 2.2: Brief outline of market research methods conducted to support the PDA/HNC Engineering Practice**

Stakeholder	Method
All	Major desk based research gathering and analysing data from various sources (eg SEMTA, FutureSkills Scotland etc)
Centres	It was decided from the outset of the redevelopment of the awards to include on the QDT representatives from all centres who delivered the Advanced Certificate (now re-titled PDA)/HNC Engineering Practice awards. This decision was made to ensure that the interests of these centres in the redevelopment process were represented and so that their experience in delivering and assessing the previous awards could be used to inform redevelopments.
Employers	Consultation took place through a questionnaire survey and members of the QDT consulting industrial contacts on the framework structure and Unit content.
Higher Education	Consultation with university staff revealed that the Advanced Certificate (now re-titled PDA)/HNC Engineering Practice awards have no advanced standing with degree courses. In fact, candidates may require too supplement the level of Mathematics they have studied on the Advanced Certificate (now re-titled PDA)/HNC Engineering Practice with additional Mathematics Unit before they are able to enter a degree course.

Stakeholder	Method
Professional Bodies	Representatives of the Institution of Engineering and Technology (IET)/The Institution of Mechanical Engineers (IMechE) have advised the QDT on the status of the awards in relation to membership of their bodies.
Candidates	While not consulted directly details of candidates' experiences of the previous Advanced Certificate/HNC Engineering Practice awards were provided by QDT members. These experiences were taken fully into account in the design of the new awards.

### 2.3 The Target Client Groups

The PDA/HNC Engineering Practice suite of awards have been developed principally for candidates in employment pursuing careers, at advanced craft and engineering supervisory level, in fabrication and welding, engineering manufacture, engineering maintenance or electrical engineering. Each of the four PDAs has been designed to provide candidates with the opportunities to develop core and specialist knowledge, understanding and skills in an advanced engineering craft area. The HNC Engineering Practice award allows candidates to develop important knowledge and skills needs to become an engineering supervisor or team leader.

The PDA/HNC Engineering Practice would normally be studied by candidates who attend a centre on a day-release or other part-time basis. The PDA/HNC Engineering Practice award structures are sufficiently flexible enough to allow centres to deliver the awards by various modes of delivery: for example, two-year day-release, evening attendance, block-release etc.

Where centres decide to offer a PDA/HNC Engineering Practice on a full-time basis it is strongly recommended that candidates are provided with opportunities to take a number of practical engineering Units in conjunction with the Units in the relevant PDA so that they acquire some useful practical skills and gain some experience of what it would be like to work in a practical engineering environment (s). Centres should also arrange appropriate industrial visits for candidates so that they can see the applications of subjects learnt on their course in practical engineering situations.

### 2.4 Links to National Occupational Standards

While none of the four PDAs/HNC Engineering Practice awards have been designed to match into specific occupational standards in engineering or management, each PDA/HNC Engineering Practice award may provide important underpinning knowledge and understanding for SVQs in Engineering or Management at level 3.

## **2.5 Employment Opportunities/Progression/Professional Recognition**

For details on employment opportunities see Aim 3.1.1 in Section 3.3 and Aim 3.2.1 in Section 3.4. For details of progression routes and professional recognition from PDA/HNC Engineering Practice awards see Aim 3.2.2 and 3.2.3 in Section 3.4 and Section 5.6.

## **3 Aims of the awards**

The aims of the PDA/HNC Engineering Practice awards are exactly the same as those for the Advanced Certificate/HNC Engineering Practice awards. The general and specific aims are shown below.

### **3.1 General Aims of the PDA/HNC Engineering Practice**

The general aims of the awards are to:

#### **3.1.1 Enhance candidates' employment prospects**

- 3.1.2 support candidates' Continuing Professional Development and career development
- 3.1.3 enable progression within the SCQF (Scottish Credit and Qualifications Framework)
- 3.1.4 develop candidates' abilities to apply analysis skills to the solution of engineering and supervisory problems
- 3.1.5 develop learning and transferable skills (including Core Skills).

### **3.2 Specific Aims of the PDA/HNC Engineering Practice**

The specific aims of the awards are to:

- 3.2.1 provide awards that will allow candidates to work now, or in the future, at advanced engineering craft and supervisory level in an engineering environment.
- 3.2.2 provide awards that create a route towards meeting the academic requirements for Engineering Technician and Incorporated Engineer status.
- 3.2.3 develop awards that on successful completion will allow candidates to progress to a relevant HNC/HND Engineering or further qualifications in a supervisory or management area.
- 3.2.4 develop a range of Communication knowledge and skills relevant to the needs of advanced engineering craft persons and engineering supervisors.

- 3.2.5 on successful completion of the HNC Engineering Practice award, achieve the Core Skill of *Communication* at Higher level. Candidates will also be provided with opportunities to develop the following Core Skills: *Information and Communication Technology, Numeracy, Problem Solving and Working with Others.*
- 3.2.6 develop knowledge, understanding and skills in advanced engineering craft principles and technologies in fabrication and welding or engineering manufacture or engineering maintenance or electrical engineering.
- 3.2.7 provide for a degree of specialisation at advanced craft level in fabrication and welding or engineering manufacture or engineering maintenance or electrical engineering.
- 3.2.8 develop knowledge, understanding and skills to undertake the role of an engineering supervisor in an engineering business environment.

### 3.3 How the General Aims are met in the PDA/HNC Engineering Practice Structures and Content

Aim No.	How it is met in the PDA/HNC Engineering Practice
3.1.1	Advanced Certificate/HNC Engineering Practice (re-titled PDA/HNC Engineering Practice) awards have for a number of years equipped candidates to seek employment as advanced craft persons and/or supervisors in a wide range of industrial, service and public sector organisations. There are a large number of people (approx 23, 000) working as skilled tradespersons in the engineering industry. The PDA/HNC Engineering Practice awards have been designed to meet many of the education and training needs of such individuals.
3.1.2	There has been a long tradition of candidates in employment taking HNC Engineering awards on a part-time basis to increase their knowledge, understanding and skills in a branch of Engineering and, thus, enhance their technical education and career development. The PDA/HNC Engineering Practice awards provide a very important route for those candidates who wish to enhance their knowledge, understanding and skills in advanced engineering crafts and engineering supervisory skills. More specifically the Unit Engineering Supervision: Teamworking and Continuing Professional Development within the HNC Engineering Practice award allows some of the key issues associated with being an engineering supervisor to be explored and on the basis of their understanding of these issues allows candidates to develop a Continuous Professional Development Action Plan with a view to developing their supervisory and other knowledge and skills over the following three to five years of their career. CPD action planning has been introduced in this Unit to encourage candidates to engage in the CPD process throughout the whole of their careers.

Aim No.	How it is met in the PDA/HNC Engineering Practice
3.1.3	All Units within the PDA/HNC Engineering Practice awards have been levelled at SCQF levels 6, 7 or 8. The new awards also conform to the SQA levelling requirements for PDA/HNC awards.
3.1.4	The nature of the Engineering discipline lends itself to the development of analysis skills. For example, such skills are required by candidates when solving electrical circuit problems or a lighting design, or when solving mechanical engineering problems or when working on a fabrication design. Analysis skills are also required at HNC Engineering Practice level when, for example, analysing quality costs or reviewing the role of an engineering supervisor in different scenarios.
3.1.5	<p>The new PDA/HNC Engineering Practice awards provide centres with an opportunity to enhance learning skills not least by creating opportunities for candidates to combine theory and practice to achieve a real understanding of a subject. For example, the core engineering Units recommend significant use of practical work and/or computer simulation to reinforce learning. It is also anticipated that centres will use innovative delivery approaches that may make use of engineering laboratory/workshop equipment and/or on-line delivery and/or Virtual Learning Environments to enhance candidate learning. Industrial visits are also highly recommended to consolidate learning in the centre.</p> <p>By their very nature Engineering courses require the transfer of technical knowledge and skills from one area to another. This is particularly the case with the PDA/HNC Engineering Practice awards where candidates are often required to transfer their knowledge of craft engineering principles and technologies from one area to the solution of problems in another area of engineering. Candidates will also have an opportunity to use the Communication knowledge and skills developed in the mandatory core HN Unit in other parts of the awards to support such activities as report writing and working in groups. Core Skills in general, and problem solving in particular, were regarded as very important by the QDT since it is recognised that a good level of competence in these is essential in the work of advanced craft persons and engineering supervisors.</p>

### 3.4 How the Specific Aims are met in the PDA/HNC Engineering Practice Structure and Content

Aim No.	How it is met in the PDA/HNC Engineering Practice
3.2.1	Advanced Certificate/HNC Engineering Practice awards have been recognised for a number of years by employers and other stakeholders of these awards as appropriate qualifications for persons wishing to work at advanced craft and engineering supervisory levels in an engineering business environment. Market research indicates that there is still a solid demand for people with advanced engineering craft and supervisory skills in Scottish companies. Thus, it is confidently anticipated that those achieving the PDA/HNC Engineering Practice awards will find employment as skilled tradespersons or supervisors in a wide range of small, medium and large companies.
3.2.2 and 3.2.3	The QDT has been advised by the Institution of Engineering and Technology (IET)/The Institution of Mechanical Engineers (IMechE) that a PDA/HNC Engineering Practice award partially meets their academic requirements for registration as an Incorporated Engineer and may meet fully their academic underpinning requirements for registration as an Engineering Technician.  The QDT was informed by university staff that an Advanced Certificate/HNC Engineering Practice is unlikely to give any advanced standing with engineering degree course although studying at 1 <sup>st</sup> year degree level may be a possibility. Candidates may have to do additional Mathematics along with their PDA/HNC Engineering Practice to gain entry to the first year of a degree course. Alternatively candidates may wish to pursue further studies by undertaking an appropriate HNC/HND Engineering qualification. A PDA/HNC Engineering Practice will provide some credit transfer opportunities towards such awards, the precise nature of which will depend on the HN Engineering award the candidate wishes to study. Following on from the HNC Engineering Practice award candidates may wish to pursue supervisory or management qualifications to further their careers as supervisors or managers. Individual centres will be able to provide information on what supervisory or management qualifications are available at the centre.

Aim No.	How it is met in the PDA/HNC Engineering Practice
3.2.4	<p>Market research information gathered through various consultations indicates that there continues to be solid support for the inclusion of a distinct Communication Unit in the mandatory core of HNC Engineering Practice award. The benefit of having a separate Communication Unit is that it significantly improves the prospect of sufficient attention being given to the teaching of this key skills area. A separate Unit also makes it possible to ensure that the Communication Core Skill at Higher level is fully embedded within the HNC Engineering Practice award. Award designers considered this a more appropriate way to ensure that this Core Skill is included in the HNC than trying to embed such a Core Skill across, say, a range of engineering Units. It should also be noted that opportunities to develop the Communication Core Skill are signposted in a number of the Units in the PDA/HNC Engineering Practice awards.</p>
3.2.5	<p>As noted above, the Communication Core Skill at Higher level has been incorporated into the HNC Engineering Practice award through the mandatory core Unit, Communication: Practical Skills.</p> <p>Opportunities to develop the Core Skills <i>Numeracy, Information and Communication Technology, Problem Solving</i> and <i>Working with Others</i> are signposted within individual Unit specifications. Candidates may achieve the <i>Information and Communication Technology</i> Core Skills at Higher level if they take the Unit Information Technology: Applications Software 1 in the optional sections of the PDA awards. The Core Skill component Using Number can be obtained if a candidate successfully achieves either the Mathematics for Engineering 1: Electronic and Electrical or Mathematics for Engineering 1: Mechanical and Manufacturing within the optional section of the HNC Engineering Practice.</p>



<b>Aim No.</b>	<b>How it is met in the PDA/HNC Engineering Practice</b>
3.2.6	Candidates will be provided with opportunities to develop knowledge, understanding and skills in a range of engineering craft principles and technologies by undertaking the mandatory Units in a PDA relevant to their area of employment or interest. For example, by undertaking the PDA in Engineering Practice: Fabrication and Welding at SCQF level 7 candidates will be able to develop knowledge, understanding and skills about welding principles and applications, container design and manufacture, inspection systems and steelwork preparation, joining and assembly. Candidates undertaking a PDA in Engineering Practice: Engineering Manufacture at SCQF level 7 will have the opportunity to develop knowledge, understanding and skills in mechanical engineering principles, CAD, CNC and engineering measurement. Candidates studying a PDA in Engineering Practice: Engineering Maintenance at SCQF level 7 will have the opportunity to develop knowledge, understanding and skills in plant systems services and utilities, mechanical engineering principles and industrial plant maintenance. Candidates taking a PDA in Engineering Practice: Electrical Engineering at SCQF level 7 will be able to develop knowledge, understanding and skills in electrical engineering principles, use of electrical instruments and electrical motors and motor starting.
3.2.7	Each of the four new PDAs also has an optional section where candidates can choose Units relevant to their area of employment, and/or future career or educational development.
3.2.8	The HNC Engineering Practice has been designed to allow candidates to develop much of the knowledge, understanding and skills they require to be an engineering supervisor. Candidates will be able to study such subjects as the role of an engineering supervisor in an organisation, effective team working and team leadership, constructing a CPD action plan, identifying the differences between Quality Control and Quality Assurance, explaining the stages in obtaining ISO 9000, selecting and applying quality improvement tools, applying quality cost models and applying Value Engineering techniques to engineering products or processes or services. Candidates will also be able to choose one Unit credit from the optional section of the HNC Engineering Practice from the following range of subjects: Production Planning and Control, Engineering Supervision: Staff and Budget Issues, Mathematics, Workplace Communication in English or Personal Development Planning.

## 4 Access to the awards

### 4.1 Access requirements

The same admission requirements apply to the PDA/HNC Engineering Practice awards as applied to the Advanced Certificate/HNC Engineering Practice awards.

Admission to a PDA/HNC Engineering Practice award should be based on a broad approach to candidate selection but, at the same time, should ensure that candidates are chosen who have the potential and ability to complete the awards successfully. To this end, the following are simply recommendations and should not be seen as a definitive or prescriptive list of entry requirements. Their purpose is simply to give guidance on the selection of candidates. It is recommended that candidates should possess the qualifications in one of the following categories:

- ◆ One Higher from Physics, Technological Studies or Mathematics and at least three Standard Grades 1–2/Intermediate 2 passes including Mathematics, Physics/Technological Studies and English.
- ◆ An appropriate National Certificate Group Award in Engineering Practice or Engineering\* (eg for candidates wishing to study a PDA in Engineering Practice: Engineering Manufacture it is recommended that they possess a National Certificate in Engineering Practice or Engineering. Likewise it is recommended that for candidates wanting to study a PDA in Engineering Practice: Electrical Engineering that they have achieved a National Certificate in Electrical Engineering Practice or Electrical Engineering).
- ◆ Qualifications comparable to the above, gained through other awarding bodies such as City and Guilds, Edexcel etc.
- ◆ At the discretion of the Principal of the presenting centre for applicants with a different experiential background who could benefit from taking the course or Units within the course, eg adult returners, overseas students with relevant work experience.

### 4.2 Recommended Core Skills Entry Level

The recommended Core Skills Entry levels for both the PDA/HNC Engineering Practice awards are as follows:

- ◆ *Communication* Intermediate 2
- ◆ *Information and Communication Technology* Intermediate 2
- ◆ *Numeracy* Intermediate 2
- ◆ *Problem Solving* Intermediate 2
- ◆ *Working with Others* Intermediate 1

### 4.3 Alternative Access Arrangements

The presenting centre may operate alternative access arrangements in cases where the candidate is convinced that he/she already has the required competences in a given area. These arrangements are as follows:

- ◆ Assessment on demand
- ◆ Credit transfer
- ◆ Accreditation of prior learning
- ◆ Relevant work experience

Individual presenting centres will require to outline their systems for each of these as a part of any approval procedure.

### 4.4 Candidates who have English as an additional language

A Unit entitled Workplace Communication in English has been included in the optional section of the HNC Engineering Practice for those candidates for whom English is an additional language.

\*Since developing the revised Advanced Certificate/HNC Engineering Practice awards in 2005-06 SQA has developed the following new National Qualification Group Awards (NQGA) in Engineering:

National Certificate in Electrical Engineering at SCQF level 5  
National Certificate in Electronic Engineering at SCQF level 5  
National Certificate in Fabrication and Welding Engineering at SCQF level 5  
National Certificate in Mechanical Maintenance Engineering at SCQF level 5  
National Certificate in Manufacturing Engineering at SCQF level 5

National Certificate in Aeronautical Engineering at SCQF level 6  
National Certificate in Electrical Engineering at SCQF level 6  
National Certificate in Electronic Engineering at SCQF level 6  
National Certificate in Fabrication and Welding Engineering at SCQF level 6  
National Certificate in Manufacturing Engineering at SCQF level 6  
National Certificate in Measurement and Control Engineering at SCQF level 6  
National Certificate in Mechanical Engineering at SCQF level 6

These new National Certificate awards have been designed to replace the existing National Certificates in Engineering Practice and Engineering. Centres have begun offering the new awards as from session 2009/10. All centres must offer the new National Certificate awards from session 2010/11. Table 4.1 shows articulation routes between the new National Certificates and PDA/HNC Engineering awards.

**Table 4.1: Articulation routes between the new National Certificates in Engineering and PDA/HNC Engineering Practice awards**

<b>New NC in Engineering</b>	<b>PDA/HNC Awards</b>
National Certificate in Electrical Engineering at SCQF level 5	PDA in Engineering Practice: Electrical Engineering at SCQF level 7 and HNC Engineering Practice
National Certificate in Electronic Engineering at SCQF level 5	PDA in Engineering Practice: Electrical Engineering at SCQF level 7 and HNC Engineering Practice
National Certificate in Fabrication and Welding Engineering at SCQF level 5	PDA in Engineering Practice: Fabrication and Welding at SCQF level 7 and HNC Engineering Practice
National Certificate in Manufacturing Engineering at SCQF level 5	PDA in Engineering Practice: Engineering Manufacture at SCQF level 7 and HNC Engineering Practice
National Certificate in Mechanical Maintenance Engineering at SCQF level 5	PDA in Engineering Practice: Engineering Maintenance at SCQF level 7 and HNC Engineering Practice

## 5 Awards structure

No changes have been made to the structure or Unit contents when converting the Advanced Certificate/HNC Engineering Practice awards into the PDA/HNC Engineering Practice awards.

The overarching PDA/HNC Engineering Practice award structure is illustrated in block diagram form in Figure 5.1.

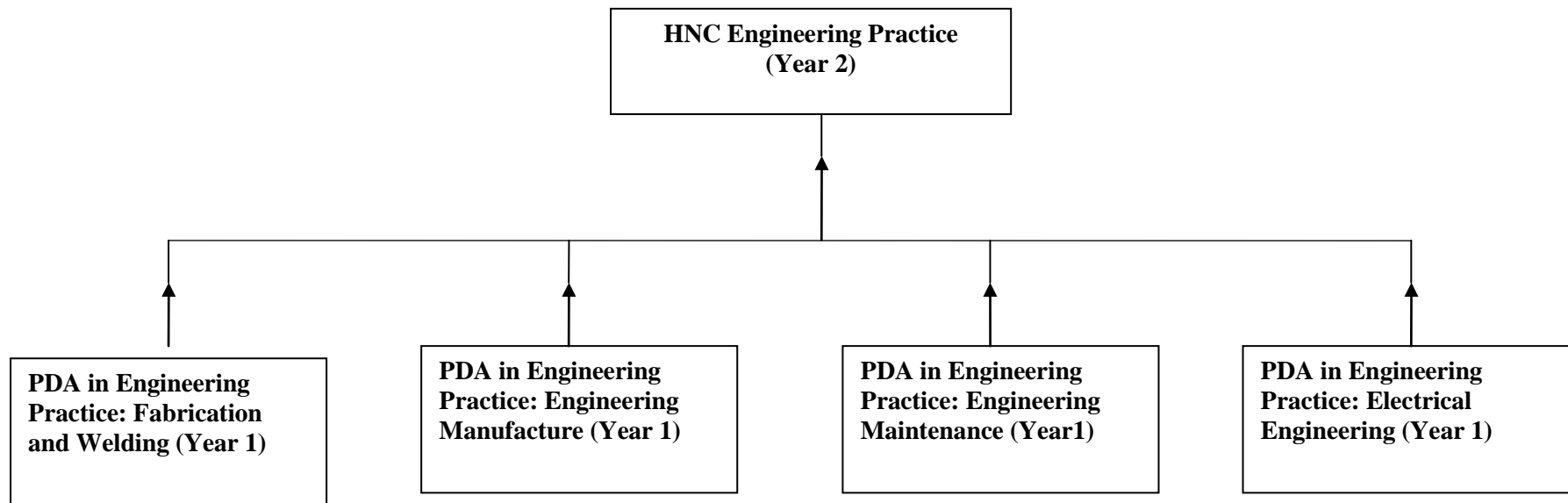
Each of the four PDA comprise of the following:

- ◆ **four** mandatory Unit credits plus **two** optional Unit credits

The HNC Engineering Practice consists of the Units making up the appropriate PDA plus:

- ◆ **five** mandatory Unit credits plus **one** optional Unit credit

**Fig 5.1 — PDA/HNC Engineering Practice Structure**



## 5.1 Framework

### 5.1.1 PDA in Engineering Practice: Fabrication and Welding 6 Unit credits

Group Award Code — G9MT 47

#### Mandatory Units (4 credits)

Unit Title	Code	SCQF credit points	SCQF level	SQA credit value
Welding Principles and Applications: 1	DR2G 34	8	7	1
Containers: Design and Manufacture	DR23 34	8	7	1
Inspection Systems	DR26 34	8	7	1
Fabrication: Preparation, Joining and Assembly	DR2C 34	8	7	1

#### Optional Units (2 credits)

Unit Title	Code	SCQF credit points	SCQF level	SQA credit value
Mechanical Engineering Principles	DV9G 34	8	7	1
Computer Aided Draughting for Engineers	DR1X 34	8	7	1
Safety Engineering and the Environment	DR2D 34	8	7	1
Advanced Pattern Development: An Introduction	DV9H 33	8	6	1
Welding Procedures: Specification, Qualification and Testing	DR24 34	8	7	1
Materials Selection	DT46 34	8	7	1
Electrical Engineering Principles 1	DW6W 33	8	6	1
Information Technology: Applications Software 1	D75X 34	8	7	1

## 5.1.2 PDA in Engineering Practice: Engineering Manufacture 6 Unit credits

Group Award Code — G9MP 47

### Mandatory Units (4 credits)

Unit Title	Code	SCQF credit points	SCQF level	SQA credit value
Mechanical Engineering Principles	DV9G 34	8	7	1
Computer Aided Draughting for Engineers	DR1X 34	8	7	1
CNC	DT5P 34	8	7	1
Engineering Measurement	DT9R 34	8	7	1

### Optional Units (2 credits)

Unit Title	Code	SCQF credit points	SCQF level	SQA credit value
Computer Integrated Manufacture	DW8G 34	8	7	1
Safety Engineering and the Environment	DR2D 34	8	7	1
Alternative Machining Operations	DW6V 34	8	7	1
Materials Selection	DT46 34	8	7	1
Pneumatics and Hydraulics	DT9X 34	8	7	1
Electrical Engineering Principles 1	DW6W 33	8	6	1
Information Technology: Applications Software 1	D75X 34	8	7	1



### 5.1.3 PDA in Engineering Practice: Engineering Maintenance 6 Unit credits

Group Award Code — G9MV 47

#### Mandatory Units (4 credits)

Unit Title	Code	SCQF credit points	SCQF level	SQA credit value
Plant Systems: Services	DW7M 34	8	7	1
Plant Systems: Utilities	DW7N 34	8	7	1
Mechanical Engineering Principles	DV9G 34	8	7	1
Industrial Plant Maintenance	DN40 34	8	7	1

#### Optional Units (2 credits)

Unit Title	Code	SCQF credit points	SCQF level	SQA credit value
Pneumatics and Hydraulics	DT9X 34	8	7	1
Engineering Systems Interfaced with Programmable Logic Controllers	DW8N 34	8	7	1
Engineering Measurement	DT9R 34	8	7	1
Computer Aided Draughting for Engineers	DR1X 34	8	7	1
Safety Engineering and the Environment	DR2D 34	8	7	1
Electrical Engineering Principles 1	DW6W 33	8	6	1
Information Technology: Applications Software 1	D75X 34	8	7	1
Applications of Programmable Logic Controllers	DG31 34	8	7	1

#### 5.1.4 PDA in Engineering Practice: Electrical Engineering 6 Unit credits

Group Award Code — G9MR 47

##### Mandatory Units (4 credits)

Unit Title	Code	SCQF credit points	SCQF level	SQA credit value
Electrical Engineering Principles 1	DW6W 33	8	6	1
Electrical Engineering Principles 2	DW6X 34	8	7	1
Application of Electrical and Electronic Instruments	DN48 33	8	6	1
Electrical Motors and Motor Starting	DV9M 34	8	7	1

##### Optional Units (2 credits)

Unit Title	Code	SCQF credit points	SCQF level	SQA credit value
Electrical Safety	DN4L 34	8	7	1
Inspection and Testing of Low Voltage Electrical Installations	DN41 34	8	7	1
Electrical Design Systems: An Introduction	DV9J 34	8	7	1
Electrical Installation Design (Computer Aided): An Introduction	DV9K 34	8	7	1
Lighting Design in Buildings	DV9L 34	8	7	1
Applications of Programmable Logic Controller	DG31 34	8	7	1
Mechanical Engineering Principles	DV9G 34	8	7	1
Fundamental Electronic Components, Devices and Applications	DW8F 33	8	6	1
Industrial Plant Maintenance	DN40 34	8	7	1

### PDA in Engineering Practice: Electrical Engineering (continued)

Unit Title	Code	SCQF credit points	SCQF level	SQA credit value
Plant Systems: Utilities	DW7N 34	8	7	1
Information Technology: Applications Software 1	D75X 34	8	7	1
Engineering Systems Interfaced with Programmable Logic Controllers	DW8N 34	8	7	1

#### 5.1.5 HNC Engineering Practice

(6 credits)

Group Award Code — G86L 15

Mandatory Units (5 credits)

Unit Title	Code	SCQF credit points	SCQF level	SQA credit value
Communication: Practical Skills	H7MB 34*	8	7	1
Engineering Supervision: Teamworking and Continuing Professional Development	DW71 34	8	7	1
Quality Management: An Introduction	DT8Y 34	8	7	1
Value Engineering	DW7K 34	8	7	1
Engineering Practice: Graded Unit 1	DW92 34	8	7	1

\*Refer to History of Changes for revision changes.

**Optional Units (1 credits)**

<b>Unit Title</b>	<b>Code</b>	<b>SCQF credit points</b>	<b>SCQF level</b>	<b>SQA credit value</b>
Engineering for Mathematics 1	H7K0 33*	8	6	1
Engineering Supervision: Staff and Budget Issues	DW7R 34	8	7	1
Production Planning and Control	H1KS 35*	8	8	1
Workplace Communication in English	H8T2 33*	8	6	1
Personal Development Planning	DE3R 34	8	7	1

\*Refer to History of Changes for revision changes.

## 5.2 Conditions of the Award

The conditions for the award of a PDA/HNC Engineering Practice are as follows:

### **PDA in Engineering Practice: Fabrication and Welding at SCQF level 7**

A candidate will be awarded a PDA in Engineering Practice: Fabrication and Welding at SCQF level 7 on successful completion of the four Unit credits in the mandatory Section of 5.1.1 together with any two Unit credits from the optional Section of 5.1.1.

### **PDA in Engineering Practice: Engineering Manufacture at SCQF level 7**

A candidate will be awarded a PDA in Engineering Practice: Engineering Manufacture at SCQF level 7 on successful completion of the four Unit credits in the mandatory Section of 5.1.2 together with any two Unit credits from the optional Section of 5.1.2.

### **PDA in Engineering Practice: Engineering Maintenance at SCQF level 7**

A candidate will be awarded a PDA in Engineering Practice: Engineering Maintenance at SCQF level 7 on successful completion of the four Unit credits in the mandatory Section of 5.1.3 together with any two Unit credits from the optional Section of 5.1.3.

### **PDA in Engineering Practice: Electrical Engineering at SCQF level 7**

A candidate will be awarded a PDA in Engineering Practice: Electrical Engineering at SCQF level 7 on successful completion of the four Unit credits in the mandatory Section of 5.1.4 together with any two Unit credits from the optional Section of 5.1.4.

### **HNC Engineering Practice**

A candidate will be awarded an HNC Engineering Practice on successful completion of a PDA in Engineering Practice: Fabrication and Welding at SCQF level 7 or a PDA in Engineering Practice: Engineering Manufacture at SCQF level 7 or a PDA in Engineering Practice: Engineering Maintenance at SCQF level 7 or a PDA in Engineering Practice: Electrical Engineering at SCQF level 7 and the successful achievement of the five mandatory Unit credits plus one Unit credit from the optional section of the HNC Engineering Practice award structure shown in Section 5.1.5.

## 5.3 Core Skills Exit Profile

### **PDAs in Engineering Practice**

None of the four PDAs have Core Skills, or Core Skill components, embedded in the mandatory core Units of the awards. However, there are opportunities for candidates to develop some of the Core Skills components as part of the delivery of the mandatory Units as identified in Table 6.1(a). Candidates who achieve the optional Information Technology: Applications Software 1 Unit will be awarded with the Using Information and Communication Technology Core Skills at Higher.

Centre staff are asked to refer to individual optional Unit specifications for details of other Advanced Certificate Core Skill component development opportunities.

### **HNC Engineering Practice**

A candidate who successfully achieves an HNC Engineering Practice will automatically obtain the following Core Skill:

- ◆ Communication Higher (fully embedded in the Unit Communication: Practical Skills)

Candidates who achieve either the Mathematics for Engineering 1: Electronic and Electrical or Mathematics for Engineering 1: Mechanical and Manufacturing Units will automatically be awarded the Core Skills component Using Number at Higher. Opportunities for candidates to develop Core Skills components as a part of the delivery of the HNC Engineering Practice are shown in Table 6.1(b).

## **5.4 SCQF levels**

The four PDAs satisfy the PDA Design Principles as follows:

All four awards are made up of more than 2 Unit credits (16 SCQF credit points) which, therefore, exceed the minimum requirement for PDA at SCQF levels 7–12 to be made up of a minimum of 16 SCQF credit points.

All four PDAs have a mandatory and optional section which reflect the title of each award.

The mandatory cores of the PDA in Engineering Practice: Fabrication and Welding; the PDA in Engineering Practice: Engineering Manufacture and the PDA in Engineering Practice: Engineering Maintenance are made up of four Unit credits at SCQF level 7. Since these mandatory cores represent more than half of the awards in terms of SCQF credit points (ie 32 credit points out of 48 credit points) these three awards automatically satisfy the PDA design principle that at least half of the SCQF credit points will be at the level of the Group Award.

With regard to the PDA in Engineering Practice: Electrical Engineering two of the four Unit credits in the mandatory core are at SCQF level 7 while the other two Unit credits are at SCQF level 6. However, all Units in the optional section are at SCQF level 7 apart from one which is at SCQF level 6 so that even if a centre includes the level 6 Unit in its programme of study, the programme will still have three Unit credits (24 SCQF credit points) at SCQF level 7 which satisfies the PDA design rule that at least half of the SCQF credit points will be at the level of the Group Award.

The five mandatory Unit credits within the HNC Engineering Practice (see Section 5.1.5) are levelled at SCQF level 7, giving 40 SCQF level 7 points. All four PDA have as a minimum 2 Unit credits at SCQF level 7 within their mandatory sections corresponding to 16 SCQF level 7 points. Thus, any of the four PDA and the HNC Engineering Practice combined has at least 56 SCQF level 7 points which satisfies the HN Design Principle that an HNC should have a minimum of 48 credits at SCQF level 7.

## **5.5 Mapping information**

Information on the way in which individual Units map into the aims of the awards can be found in the Tables in Sections 3.3 and 3.4.

## **5.6 Articulation, professional recognition and credit transfer**

### **5.6.1 Articulation**

University staff indicated that the previous Advanced Certificate/HNC Engineering Practice awards carried no advanced standing with regard to university degree courses. In fact, it was commented that candidates may have to supplement the level of Mathematics they studied on an Advanced Certificate/HNC Engineering Practice award with an additional Mathematics Unit (s) before they would be able to enter a degree course. As the PDA/HNC Engineering Practice awards simply represent a change of title there is no reason to believe that universities will have changed their position regarding the entry status of the PDA/HNC Engineering Practice with respect to their degree programmes.

Candidates successfully completing a PDA/HNC Engineering Practice award may alternatively pursue further studies through an appropriate HN Engineering qualification (eg HNC/D Electrical Engineering or HNC/HND Mechanical Engineering). A PDA/HNC Engineering Practice will provide some credit transfer opportunities towards such awards, the precise nature of which will depend on the HN Engineering award the candidate is pursuing. Following on from the HNC Engineering Practice award candidates may wish to pursue supervisory or management qualifications to further their careers as supervisors or managers. Individual centres will be able to provide information on what supervisory or management qualifications are available to candidates.

### **5.6.2 Professional Body Recognition**

The Institution of Engineering and Technology (IET)/The Institution of Mechanical Engineers (IMechE) have advised that a PDA/HNC Engineering Practice award partially meets the underpinning knowledge and understanding requirements for registration as an Incorporated Engineer and may meet fully the underpinning knowledge and understanding requirements for registration as an Engineering Technician.

### **5.6.3 Credit Transfer**

Credit transfer arrangements for Units in the PDA/HNC Engineering Practice award framework that have already been validated as part of previous HNC/HND Group Award validations are shown in the appropriate arrangements documents. Credit transfer arrangements between Units in the previous Advanced Certificate/HNC Engineering Practice and Units unique to the PDA/HNC Engineering Practice awards are shown in Table 5.6 on the following pages.

**Table 5.6: Credit Transfer Opportunities**

Existing Unit No.	Existing Unit Title	New Unit No.	New Unit Title	Level of Credit Transfer	Comments
D5R1 04	Alternative Machining Methods	DW6V 34	Alternative Machining Operations	70%	High pressure water cutting and Rapid Manufacture missing in old Unit
D5R9 05	Electromechanical Applications			0%	No equivalent Unit in new Practice Framework
D5R0 04	Engineering Practice Science Applications	DV9G 34	Mechanical Engineering Principles	100%	
D5R7 04	Fault Finding in Electromechanical Systems			0%	No equivalent Unit in new Practice Framework
D4HS 04	Fundamental Electrical and Electronic Principles	DW6W 33	Electrical Engineering Principles 1	50%	<p>O.1 in existing Unit on solution to dc circuit problems is equivalent to O.1 in the new Unit apart from the fact that Thevinin's Theorem is not done to Electrical Engineering Principles 2.</p> <p>O.2 in the existing Unit on the solution of ac circuit problems is equivalent to O.4 in the new Unit apart from the fact that parallel ac circuits are not done until Electrical Engineering Principles 2.</p>



**Table 5.6: Credit Transfer Opportunities (continued)**

Existing Unit No.	Existing Unit Title	New Unit No.	New Unit Title	Level of Credit Transfer	Comments
D5R4 04	Introduction to Advanced Pattern Development	DV9H 33	Advanced Pattern Development: An Introduction	100%	
D4KD 04	Plant Systems: Services	DW7M 34	Plant Systems: Utilities	40%	O.1 to O.3 in existing Unit — no equivalent O.4 in existing Unit equivalent to O.3 on boilers in new Unit. O.5 in existing Unit equivalent to O.4 on commissioning in new Unit
D4KC 04	Plant Systems: Utilities	DW7N 34	Plant Systems: Utilities  Plant Services: Services	50%  25%	Pumps and fans and refrigeration systems common O.2 Outcome on compressed air systems equivalent to O.1 and O.2 on compressed air systems in new Unit O.4 on air-conditioning in old Unit — no equivalent

**Table 5.6: Credit Transfer Opportunities (continued)**

New Unit Title	New Unit Code	Old Unit Title	Old Unit Code	Credit Transfer Conditions
Engineering Mathematics 1	H7K0 33	Mathematics for Engineering 1:Electronics and Electrical	DG4H 33	To gain credit transfer to the new unit candidates will have to provide additional evidence relating to functions as specified in the Evidence requirements in respect of the first three knowledge/skills in Outcome 1 and relating to vectors as specified in the first three knowledge/skills in outcome 3.
Engineering Mathematics 1	H7K0 33	Mathematics for Engineering 1:Mechanical and Manufacturing	DT5X 33	To gain credit transfer to the new unit candidates will have to provide additional evidence relating to functions as specified in the Evidence requirements in respect of the first three knowledge/skills in Outcome 1 and relating to 3D vectors and complex numbers as specified in the knowledge/skills in outcome 3.
Engineering Mathematics 2	H7K1 34	Mathematics for Engineering 2	DG4L 34	To gain credit transfer to the new unit candidates will have to provide additional evidence relating to trigonometric and hyperbolic functions as specified in the Evidence requirements in respect of Outcome 1.

## 6 Approaches to delivery and assessment

### 6.1 Delivery

As mentioned in Section 2.3 the QDT were firmly of the view that the PDA/HNC Engineering Practice suite of awards are principally for candidates in employment and would, therefore, normally be studied by candidates who attend a centre on a day-release or other part-time basis. The PDA/HNC Engineering Practice award structures are sufficiently flexible enough to allow centres to deliver the awards by various modes of delivery for example, two-year day-release, evening attendance, block-release etc.

Where centres decide to offer a PDA/HNC Engineering Practice on a full-time basis it is strongly recommended that candidates are provided with opportunities to take a number of practical engineering Units in conjunction with Units in the relevant award structure so that they can acquire some useful practical skills and gain some exposure to what it may be like working in a practical engineering environment (s). Centres are also encouraged to arrange a number of industrial visits for their candidates so that they can see some applications of subjects learnt on their course in practical engineering environments.

With regard to timetabling centres may timetable a PDA and the HNC Engineering Practice in sequence (ie the six PDA Units first followed by the six HNC Engineering Practice Units) as illustrated in the first timetable for a PDA in Engineering Practice: Engineering Manufacture at SCQF level 7/HNC Engineering Practice in Appendix 1. Alternatively, centres may mix the timetabling of a PDA and HNC Engineering Practice Units to meet different candidate and employer needs as illustrated in the second timetable for the PDA in Engineering Practice: Electrical Engineering at SCQF level 7/HNC Engineering Practice in Appendix 1.

Centres should take account of information contained in the Recommended Prior Knowledge and Skills statements in Unit specifications in sequencing the delivery of Units (eg it would be normal to deliver the Electrical Engineering Principles 1 Unit before the Electrical Engineering Principles 2 Unit).

Centres, working on their own or in partnership, might also wish to consider the following approaches to delivering the PDA/HNC Engineering Practice awards:

- ◆ Identification and sharing of good candidate learning support materials on the internet
- ◆ Use of the Internet by candidates to undertake more in-depth investigations in given subject areas
- ◆ Development or purchase of paper based and/or electronic candidate learning support and assessment materials for individual Units (eg for certain optional Units)
- ◆ Development of on-line Unit and Graded Unit assessment materials
- ◆ Use of e-mentoring arrangements to support candidates who study at a distance

One of the key reasons the QDT has sought to reduce the time candidates have to spend on summative Unit assessment is to provide lecturers with more time to deliver Units. Lecturers are encouraged, in particular, to use this additional time to reinforce learning in core engineering and supervisory concepts and principles and in the transfer of knowledge, understanding and skills across subject boundaries.

Lecturers may use a variety of teaching and learning approaches in delivering the Units in the PDA/HNC Engineering Practice awards. These may include lecturing, group work, laboratory and practical work, computer simulation (using appropriate software packages), project work and case studies. The use of open and distance learning and on-line materials may help to supplement and support the learning that takes place in the classroom, laboratory or workshop.

Lecturers should also seek opportunities to integrate Core Skills within their teaching and learning programmes. Such opportunities may include the following: -

### ***Communication***

- ◆ Providing candidates opportunities to develop their oral skills by allowing them to give full answers to questions asked by the lecturer
- ◆ Developing complex, vocationally specific reading skills (eg Communication: Practical Skills.)
- ◆ Developing report writing skills in a number of Units (eg Computer Aided Manufacture, Value Engineering)
- ◆ Allowing candidates to develop their Communication skills in group work activities (eg Communication: Practical Skills, Engineering Supervision: Teamworking and Continuing Professional Development)

### ***Numeracy***

- ◆ Reinforcing Numeracy and Mathematical skills when teaching engineering principles (eg Mechanical Engineering Principles, Electrical Engineering Principles 1, Electrical Engineering Principles 2)
- ◆ Reinforcing Using Graphical Information skills by use of a range of graphical representations (eg Electrical Installation Design (Computer Aided): An Introduction, Containers: Design and Manufacture)

### ***Information and Communication Technology***

- ◆ Develop *Information and Communication Technology* skills through the application of IT within engineering systems (eg Computer Aided Draughting for Engineers, Quality Management: An Introduction)

### ***Problem Solving Skills***

- ◆ Develop Critical Thinking Skills through the application of engineering concepts and principles to solve engineering systems (eg Lighting Design in Buildings, Value Engineering)
- ◆ Develop Planning and Organisational Skills within an engineering and supervisory context (eg Industrial Plant Maintenance, Engineering Supervision: Teamworking and Continuing Professional Development)
- ◆ Develop review and evaluation skills within an engineering and supervisory context (eg Inspection Systems, Value Engineering)

### ***Working with Others***

- ◆ Develop Working with Others skills through identifying approaches to developing high performance team and group discussions on the solution to engineering problems (eg Engineering Supervision: Teamworking and Continuing Professional Development, Containers: Design and Manufacture)

Opportunities for candidates to develop some Core Skills components as part of the delivery of PDA mandatory Units are identified in Table 6.1(a). Likewise Core Skill component development opportunities within the HNC Engineering Practice are shown in Table 6.1(b). Centre staff are asked to refer to individual optional Unit specifications for details of other PDA/HNC Engineering Practice Core Skill component development opportunities.

**Table 6.1(a) PDA — Core Skills development opportunities in mandatory Units**

*Note: CT = Critical Thinking; P and O = Planning and Organisation and R and E = Reviewing and Evaluating*

Unit Title	Communication			Numeracy		Information and Communication Technology	Problem Solving			Working with Others
	Read	Write	Oral	Using Number	Using Graphical Inform.	Using Information Technology	CT	P and O	R and E	Working with Others
<b>PDA in Engineering Practice: Fabrication and Welding</b>										
Welding Principles and Applications 1	Higher	Higher					Higher	Higher		
Containers: Design and Manufacture	Higher	Higher	Higher	Higher	Higher	Higher	Higher	Higher	Higher	Intermediate 2
Inspection Systems	Higher	Higher			Higher		Higher	Higher	Higher	
Fabrication: Steelwork Preparation, Joining and Assembly	Higher	Higher					Higher	Higher		

**Table 6.1(a) PDA — Core Skills development opportunities in mandatory Units (continued)**

Unit Title	Communication			Numeracy		Information and Communication Technology	Problem Solving			Working with Others
	Read	Write	Oral	Using Number	Using Graphical Inform.	Using Information Technology	CT	P and O	R and E	Working with Others
<b>PDA in Engineering Practice: Engineering Manufacture</b>										
Mechanical Engineering Principles		Int. 2		Int. 2			Int. 2			
Computer Aided Draughting for Engineers						Higher				
CNC		Int. 2				Higher	Higher			
Engineering Measurement					Higher					
<b>PDA in Engineering Practice: Engineering Maintenance</b>										
Plant Systems: Service		Higher			Higher		Higher			
Plant Systems: Utilities		Higher					Higher			

**Table 6.1(a) PDA — Core Skills development opportunities in mandatory Units (continued)**

Unit Title	Communication			Numeracy		Information and Communication Technology	Problem Solving			Working with Others
	Read	Write	Oral	Using Number	Using Graphical Inform.	Using Information Technology	CT	P and O	R and E	Working with Others
<b>PDA in Engineering Practice: Engineering Maintenance</b> (continued)										
Mechanical Engineering Principles		Int. 2		Int. 2			Int. 2			
Industrial Plant Maintenance	Higher	Higher			Int.2	Int. 2	Higher	Higher	Higher	Int. 1
<b>PDA in Engineering Practice: Electrical Engineering</b>										
Electrical Engineering Principles 1				Int.2			Int.2			
Electrical Engineering Principles 2				Higher			Higher			
Applications of Electrical and Electronic Instruments		Higher			Int.2	Int.2	Int.2		Int.2	
Electrical motors and motor starting					Int. 2		Higher			



**Table 6.1(b) HNC Engineering Practice — Core Skills development opportunities in mandatory Units**

*Note: CT = Critical Thinking; P and O = Planning and Organisation and R and E = Reviewing and Evaluating*

Unit Title	Communication			Numeracy		Information and Communication Technology	Problem Solving			Working with Others
	Read	Write	Oral	Using Number	Using Graphical Inform.	Using Information Technology	CT	P and O	R and E	Working with Others
Communication: Practical Skills	Higher Embedded	Higher Embedded	Higher Embedded							
Engineering Supervision: Team working and Continuing Professional Development	Higher	Higher	Higher				Higher	Higher	Higher	Higher
Quality Management: An Introduction		Higher			Higher	Higher	Higher			
Value Engineering		Higher	Higher				Higher	Higher	Higher	Higher
Engineering Practice: Graded Unit 1	Higher	Higher		Higher			Higher			

## **6.2 Assessment**

### **6.2.1 Introduction**

From the outset of developments the QDT recognised the need to have an appropriate assessment strategy in place for the Advanced Certificate/HNC Engineering Practice (now re-titled PDA/HNC Engineering Practice) awards. Such a strategy was developed and is shown below:

#### **Aims**

The aims of the strategy are to ensure that:

- 1 consistent, rigorous and efficient approaches are adopted to the development and administration of PDA/HN Engineering Practice assessment instruments at both Unit and Graded Unit levels, which satisfy nationally agreed standards;
- 2 the assessment load on candidates and staff is sensible and that assessment does not unduly detract from teaching and learning;
- 3 as far as possible reliable and rigorous moderation processes are put in place in order to ensure that consistent national standards are achieved for all PDA/HNC Engineering Practice assessments.

#### **Objectives**

Listed below are the measures that have been put in place to meet the aims:

- 1 Develop nationally one assessment exemplar pack for the mandatory Units in each of the PDA and the HNC Engineering Practice that clearly sets out the standards of assessment expected in Units.
- 2 Adopt a holistic approach to Unit assessment. The implications of this are as follows:
  - i Assessment instruments will normally be designed only to sample knowledge and skills in a Unit (this is consistent with the new HN Unit format)
  - ii A Unit assessment strategy will be adopted, where possible, to produce a single assessment instrument for the whole Unit. Where this is not possible the assessment strategy will seek to ensure that the minimum number of assessment instruments is required consistent with maintaining agreed national standards.
- 3 Whilst not seeking to be entirely prescriptive with regard to the time spent on assessment in each HN Unit, over assessment should be avoided if the following guideline is adopted for the maximum time spent on HN Unit assessment:

One and a half hours per Unit credit for HN Units at SCQF levels 6 and 7 and two hours per Unit credit for HN Units at SCQF level 8.

- 4 Produce assessment exemplar packs for the Graded Unit. In addition, for the Graded Unit examination produce at least one sample exam paper to show the standards expected in such a paper
- 5 Actively encourage centres to work in partnership in producing Graded Unit assessment materials, which meet nationally agreed standards reducing, in turn, the workload on staff in individual colleges.
- 6 Ensure that consistent and rigorous internal and external moderation procedures operate through both HN Unit level and Graded Unit assessment processes. This places a clear responsibility on both centres and the SQA.

As far as has been practical the above objectives have been adhered to when developing assessment exemplar and Graded Unit materials.

## 6.2.2 Graded Units

The purpose of the Graded Unit within the PDA/HNC Engineering Practice award structure is to assess the candidate's ability to apply and integrate knowledge and/or skills gained within individual Units. By this means candidates will demonstrate that they have achieved the aims of the awards as detailed in Section 3. The Graded Unit also provides the means by which candidate achievement can be graded.

PDA/HNC Engineering Practice candidates will undertake a **one** credit Graded Unit at SCQF level 7. This will be in the form of a 3-hour written examination.

### Engineering Practice: Graded Unit 1 — Examination

The specifications for the Engineering Practice: Graded Unit 1 can be found on the SQA website ([www.sqa.org.uk](http://www.sqa.org.uk)). The Graded Unit draws on the Outcomes in the mandatory sections of the relevant PDA and the HNC Engineering Practice award.

The examination paper consists of the following two sections:

Section A;

Section B.

Section A should be subdivided into up to four individual sub-sections to reflect the four different engineering disciplines candidates may have studied at PDA level: namely Fabrication and Welding, Engineering Manufacture, Engineering Maintenance and Electrical Engineering. Each sub-section should comprise of a suitable balance of between 8 to 12 short answer, restricted response and structured questions. Candidates should answer all questions in the relevant sub-section of Section A. Candidates should be able to score up to a maximum of 50% from the sub-section they have answered questions from.

Section B should comprise of a Case Study based around the HNC Engineering Practice mandatory Units in which candidates have to answer questions on appropriate engineering supervisory issues and problems. All candidates, irrespective of which engineering discipline they have studied at PDA level, should answer all questions in Section B. The question paper associated with the Case Study should comprise of between 6 and 10 restricted response questions. Candidates should be able to score a maximum of 50% from Section B. Candidates

should be given a copy of the Case Study only, a minimum of 14-days before they sit the examination.

The examination should be conducted under closed-book, supervised conditions with candidates only being allowed to bring into the examination up to 3 sides of A4 hand written notes they have prepared on the Case Study. These notes should be handed to the invigilator at the end of the examination. Candidates should be allowed to bring a scientific calculator into the examination.

It is recommended that candidates do not sit the Graded Unit examination until the end of the PDA/HNC Engineering Practice programme of study given the range of Units that the Graded Unit draws on.

### 6.2.3 Assessment Exemplar Materials

Assessment exemplar packs have been produced for the following mandatory Units in the four PDAs and HNC Engineering Practice award.

DR2G 34	<i>Welding Principles and Applications: 1</i>
DR23 34	<i>Containers: Design and Manufacture</i>
DR26 34	<i>Inspection Systems</i>
DR26 34	<i>Fabrication: Preparation, Joining and Assembly</i>
DV9G 34	<i>Mechanical Engineering Principles</i>
DR1X 34	<i>Computer Aided Draughting for Engineers</i>
DT5P 34	<i>CNC</i>
DT9R 34	<i>Engineering Measurement</i>
DW7M 34	<i>Plant Systems: Services</i>
DW7N 34	<i>Plant Systems: Utilities</i>
DN40 34	<i>Industrial Plant Maintenance</i>
DW6W 33	<i>Electrical Engineering Principles 1</i>
DW6X 34	<i>Electrical Engineering Principles 2</i>
DN48 33	<i>Application of Electrical and Electronic Instruments</i>
DV9M 34	<i>Electrical Motors and Motor Starting</i>
D77G 34	<i>Communication: Practical Skills</i>
DW71 34	<i>Engineering Supervision: Teamworking and Continuing Professional Development</i>
DT8Y 34	<i>Quality Management: An Introduction</i>
DW7K 34	<i>Value Engineering</i>

An assessment exemplar pack and an additional sample examination paper have been produced for DW92 34 *Engineering Practice: Graded Unit 1*.

### 6.2.4 Formative Assessment

Formative assessment should be used throughout the delivery of Units to reinforce learning, build candidates' confidence and prepare candidates for summative assessment.

## 6.3 Resources

### Practical Resources

Centre staff are advised to read individual Unit specifications carefully to identify the consumables, equipment and/or software requirements to deliver Units. Some Units have specific requirements. For example, the Computer Aided Draughting in Engineering and Electrical Installation Design (Computer Aided): An Introduction require candidates to use industrially specific software. The Computer Integrated Manufacture Unit requires candidates to be able to access CNC equipment.

While not all Units require practical resources, centres are strongly recommended to provide candidates with access to practical workshop facilities appropriate to the particular PDA. For example, candidates undertaking the PDA in Engineering Practice: Fabrication and Welding at SCQF level 7 should have access to practical fabrication and welding facilities. Such access will allow candidates to relate the theory they are being taught to practice.

When teaching subjects such as pumps, fans, electrical motors etc centres should allow candidates to view disassembled equipment so that they can gain a greater appreciation of the construction of these items of plant. A good chart or other visual aid showing the various parts of an item of plant can also be a very good teaching aid.

The QDT strongly recommend the use of simulation software to support teaching and learning. However, the Team do not believe that such software should be used at the expense of practical workshop and laboratory activities. The Team strongly considers that such practical activities represent the best way for candidates to relate the theory they learn in the classroom to practical engineering.

The QDT believe that there is a very rich and varied range of teaching and learning resources available to deliver individual PDA and HNC Engineering Practice Units. Such learning resources include textbooks, reports, papers, standards, CDs, DVDs and numerous sites on the Internet. Some centres may already have good learning resources in their learning libraries/Virtual Learning Environments. It is anticipated that the Qualification Support Team (QST) for the PDA/HNC Engineering Practice will provide a useful forum for the identification and sharing of learning resources.

### Continuing Professional Development

The QDT are firmly of the view that active staff CPD is essential if the delivery and assessment of individual PDAs and HNC Engineering Practice Units are to be kept up to date, relevant and interesting. Staff CPD activities could be in subject areas such as the following (the list is not intended to be exhaustive):

- ◆ Learning to use specialist engineering software
- ◆ Modern manufacturing methods
- ◆ New or revised standards and regulations
- ◆ Issues relating to health and safety
- ◆ Quality Control and Quality Assurance
- ◆ Value Engineering
- ◆ New teaching and assessment methodologies
- ◆ E-learning

## 6.4 Open and Distance Learning

Advice on the use of open and distance learning is given in individual Unit specifications. However, where it is used with regard to assessment, planning would be required by the centre concerned to ensure the sufficiency and authenticity of candidate evidence. Arrangement would be required to be put in place to ensure that the assessment or assessments were conducted under the conditions specified in the Unit specification. For example, in the case of a Unit which involved a Unit end test a centre would have to make arrangements for the test to be conducted under controlled, supervised conditions. Likewise, where a Unit involves a practical based assessment, a centre would have to make arrangements for candidates to come into the centre, or another appropriate venue, to undertake the assessment under the conditions specified in the Unit specification.

It should be noted that the same requirements as specified in the previous paragraph apply where part or all of a Unit is delivered on-line.

## 7 General information for centres

### Candidates with disabilities and/or additional support needs

The additional support needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments, or considering alternative Outcomes for Units. Further advice can be found in the SQA document Guidance on Assessment Arrangements for Candidates with Disabilities and/or Additional Support Needs ([www.sqa.org.uk](http://www.sqa.org.uk)).

### Internal and external moderation

All instruments of assessment used within this/these Group Award(s) should be internally moderated, using the appropriate policy within the centre and the guidelines set by SQA.

External moderation will be carried out by SQA to ensure that internal assessment is within the national guidelines for these qualifications.

Further information on internal and external moderation can be found in SQA's Guide to Assessment ([www.sqa.org.uk](http://www.sqa.org.uk)).

## 8 General information for candidates

The new Professional Development Award (PDA)/HNC Engineering Practice awards have been designed by an expert team of educators and industrialists with a view to allowing you to meet the educational and training requirements to work as an advanced craftsperson and engineering supervisor. The new qualifications contain up-to-date and relevant engineering and supervisory subject content and skills and have also been designed to satisfy the new SQA PDA/Higher National Design Principles.

The PDA/HNC Engineering Practice award structure consists of four, 6-credit PDAs in Fabrication and Welding or Engineering Manufacture or Engineering Maintenance or Electrical Engineering. Each of these four PDAs is at SCQF level 7. You should choose to study the PDA which best meets your employment and

educational requirements. Regardless of which PDA you study, you will, along with other candidates, study the single 6-credit HNC Engineering Practice. To obtain a PDA you must successfully achieve the 6-credits in the relevant PDA award framework. To achieve an HNC Engineering Practice you must achieve a PDA and the 6-Unit credits in the HNC Engineering Practice.

Studying a PDA will allow you to develop your knowledge, understanding and skills in your chosen advanced engineering craft discipline. Each PDA consists of a 4-credit mandatory section and an optional section where you can choose two Unit credits from a range of Units to suit your employment and education needs. The mandatory sections of the four PDAs contain the subjects shown in the table below:

<b>PDA</b>	<b>Subjects in Mandatory section</b>
PDA in Engineering Practice: Fabrication and Welding at SCQF level 7	Welding principles and applications, container design and manufacture, inspection systems and fabrication steelwork preparation, joining and assembly
PDA in Engineering Practice: Engineering Manufacture at SCQF level 7	Mechanical engineering principles, CAD, CNC and engineering measurement
PDA in Engineering Practice: Engineering Maintenance at SCQF level 7	Plant Systems: services and utilities, mechanical engineering principles and industrial plant maintenance.
PDA in Engineering Practice: Electrical Engineering at SCQF level 7	Electrical principles, applications of electrical and electronic instruments and electric motors and motor starting

In the HNC Engineering Practice you will be provided with opportunities to develop much of the knowledge, understanding and skills to become an engineering supervisor. Five Unit credits in the HNC Engineering Practice are mandatory. These Units are Communication: Practical Skills, Engineering Supervision: Teamworking and Continuing Professional Development, Quality Management: An introduction, Value Engineering and the Engineering Practice examination. You will be able to choose one Unit in the HNC Engineering Practice from the following options: Mathematics (with either an electrical or mechanical bias), further supervisory studies in staffing and budget control, Production Planning and Control, Workplace Communication in English or Personal Development Planning.

The teaching and learning processes that your lecturers are likely to use on a PDA/HNC Engineering Practice are as follows: lecturing, group work, practical engineering work, measurement and testing, computer simulation and project work. Industrial visits may also be included in your programme of study to allow you to see 'real life' engineering in action.

The Qualifications Design Team has ensured that assessment in the awards meet national standards. The awards have been designed to optimise assessment so that sufficient time is available for you to learn the advanced engineering craft and supervisory knowledge and skills that are essential to being a good craft/trades person and engineer supervisor.

You can expect to do assessment at individual Unit level and at qualification level. At Unit level assessments will normally consist of written tests and/or practical exercises which will include the preparation of reports. Your lecturer should tell you at the start of the Unit what form Unit assessment(s) will take. In addition to Unit assessment there will also be a 3-hour examination. This examination will be designed to assess you on your knowledge, understanding and skills in your chosen advanced craft area and in the HNC Engineering Practice award. You should ask your lecturer for more details about the composition of the examination paper and when you will sit it.

The Qualification Design Team does not wish to place any artificial barriers in the way of potential candidates wanting to study a PDA/HNC Engineering Practice award. However, it would be unfair to enrol a candidate into a PDA/HNC who did not have a realistic chance of successfully achieving the awards. The Qualification Design Team would therefore recommend that a candidate had one of the following qualifications before entering a PDA/HNC Engineering:

- 1 One Higher from Physics, Technological Studies or Mathematics and at least three Standard Grades 1–2/Intermediate 2 passes including Mathematics, Physics/Technological Studies and English.
- 2 An appropriate National Certificate in Engineering Practice or Engineering or an appropriate National Certificate in Engineering at SCQF level 5.
- 3 Equivalent qualifications or experience to those shown in (1) and (2).

On completion of your PDA/HNC Engineering Practice award there may be opportunities for you to progress to a 'Higher National technician qualification' in, say, Mechanical or Electrical Engineering if that is what you prefer to do. Your PDA/HNC Engineering Practice qualification should provide you with some credit transfer opportunities towards the 'technician HNC/HND.' The precise nature of credit transfer will depend on the HNC/HND you decide to study.

Alternatively, on completion of your PDA/HNC Engineering Practice award, you may decide to study a supervisory or management qualification. Many centres offer such qualifications and you are advised to obtain further information from centres on the range of supervisory or management qualifications they offer.



## 9 Glossary of terms

**SCQF:** This stands for the Scottish Credit and Qualification Framework, which is a new way of speaking about qualifications and how they inter-relate. We use SCQF terminology throughout this guide to refer to credits and levels. For further information on the SCQF visit the SCQF website at [www.scqf.org.uk](http://www.scqf.org.uk)

**SCQF credits:** One HN credit is equivalent to 8 SCQF credit points. This applies to all HN Units, irrespective of their level.

**SCQF levels:** The SCQF covers 12 levels of learning. HN Units will normally be at levels 6–9. Graded Units will be at level 7 and 8.

**Subject Unit:** Subject Units contain vocational/subject content and are designed to test a specific set of knowledge and skills.

**Graded Unit:** Graded Units assess candidates' ability to integrate what they have learned while working towards the Units of the Group Award. Their purpose is to add value to the Group Award, making it more than the sum of its parts, and to encourage candidates to retain and adapt their skills and knowledge.

**Dedicated Core Skill Unit:** This is a Unit that is written to cover one or more particular Core Skills, eg HN Units in Information Technology or Communications.

**Embedded Core Skills:** This is where the development of a Core Skill is incorporated into the Unit and where the Unit assessment also covers the requirements of Core Skill assessment at a particular level.

**Signposted Core Skills:** This refers to the opportunities to develop a particular Core Skill at a specified level that lie outwith automatic certification.

**Qualification Design Team:** The QDT works in conjunction with a Qualification Manager/Development Manager to steer the development of the HNC/D from its inception/revision through to validation. The group is made up of key stakeholders representing the interests of centres, employers, universities and other relevant organisations.

**Consortium-devised HNCs and HNDs** are those developments or revisions undertaken by a group of centres in partnership with SQA.

**Specialist single centre and specialist collaborative devised HNCs and HNDs** are those developments or revisions led by a single centre or small group of centres who provide knowledge and skills in a specialist area. Like consortium-devised HNCs and HNDs, these developments or revisions will also be supported by SQA.

## 10 Appendix

Appendix 1: Sample Teaching Timetables

See following pages for Appendix 1.

## **Appendix 1: Sample Teaching Timetables**

- 1 Two year part-time PDA in Engineering: Engineering Manufacture at SCQF level 7/HNC Engineering Practice
- 2 Two year part-time PDA in Engineering: Electrical Engineering at SCQF level 7/HNC Engineering Practice

**Two Year, Part-Time PDA in Engineering Practice: Engineering Manufacture/HNC Engineering Practice**

**First Year, First Semester**

Mechanical Engineering Principles	Computer Aided Draughting for Engineers	Options 1 (from the PDA in Engineering: Engineering Manufacture options)
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**First Year, Second Semester**

Engineering Measurement	CNC	Options 2 (from the PDA in Engineering: Engineering Manufacture options)
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**Two Year, Part-Time PDA in Engineering Practice: Engineering Manufacture/HNC Engineering Practice (cont.)**

**Second Year, First Semester**

Communication: Practical Skills	Engineering Supervision: Teamworking and Continuing Professional Development	Quality Management: An Introduction
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**Second Year, Second Semester**

Value Engineering	Optional Unit (from the HNC Engineering Practice options)	Engineering Practice: Graded Unit 1
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**Two Year, Part-Time PDA in Engineering Practice: Electrical Engineering/HNC Engineering Practice**

**First Year, First Semester**

Communication: Practical Skills	Mathematics for Engineering 1: Electronic and Electrical (HNC Engineering Practice options)	Electrical Engineering Principles 1
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**First Year, Second Semester**

Application of Electrical and Electronic Instruments	Electrical Motors and Motor Starting	Electrical Engineering Principles 2
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**Two Year, Part-Time PDA in Engineering Practice: Electrical Engineering/HNC Engineering Practice (cont.)**

**Second Year, First Semester**

<p>Engineering Supervision: Teamworking and Continuing Professional Development</p>	<p>Quality Management: An Introduction</p>	<p>Option 1 (from the PDA in Engineering Practice: Electrical Engineering options)</p>
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**Second Year, Second Semester**

<p>Value Engineering</p>	<p>Option 2 (from the PDA in Engineering Practice: Electrical Engineering options)</p>	<p>Engineering Practice: Graded Unit 1</p>
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