apprenticeship
FRAMEWORK

Advanced Manufacturing Level 6 (Wales)

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Apprenticeships

Advanced Manufacturing Level 6 (Wales)

Contents

Framework summary

Advanced Manufacturing Level 6

Higher Apprenticeship in Advanced Manufacturing Level 6

Pathways for this framework at level 6 include:

Pathway 1: Aerospace

Competence qualifications available to this pathway:

C1 - UK Standard for Professional Engineering Competence (Incorporated Engineer)

C2 - Level 4 NVQ Extended Diploma in Engineering Manufacture (QCF)

Knowledge qualifications available to this pathway:

K1 - B Eng (Hons) Aeronautical and Mechanical Engineering

K2 - BSc (Hons) Computer Systems Integration

K3 - BSc (Hons) Engineering

K4 - BEng (Hons) Engineering (Mechanical)

K5 - BEng (Hons) Mechanical Engineering

Combined qualifications available to this pathway:

N/A

This pathway also contains information on:

- Employee rights and responsibilities
- Essential skills

Pathway 2: Nuclear Related Technology

Competence qualifications available to this pathway:

C1 - UK Standard for Professional Engineering Competence (Incorporated Engineer)

C2 - Level 4 NVQ Extended Diploma in Engineering Manufacture (QCF)

Knowledge qualifications available to this pathway:

K1 - BEng (Hons) Engineering (Mechanical)

K2 - BEng (Hons) Mechanical Engineering

K3 - B Eng (Hons) Mechanical Engineering

K4 - BEng (Hons) Industrial Engineering

Combined qualifications available to this pathway:

N/A

This pathway also contains information on:

- Employee rights and responsibilities
- Essential skills

Pathway 3: Mechanical

Competence qualifications available to this pathway:

C1 - UK Standard for Professional Engineering Competence (Incorporated Engineer)

C2 - Level 4 NVQ Extended Diploma in Engineering Manufacture (QCF)

Knowledge qualifications available to this pathway:

K1 - BEng (Hons) Mechanical Engineering

K2 - BEng (Hons) Mechanical Engineering

K3 - BEng (Hons) top-up Integrated Engineering (Electrical)

K4 - BEng (Hons) top-up Integrated Engineering (Mechanical)

K5 - BEng (Hons) Mechanical Engineering

K6 - BEng (Hons) Materials Engineering (Top-up degree)

K7 - BEng (Hons) Industrial Engineering

Combined qualifications available to this pathway:

N/A

This pathway also contains information on:

- Employee rights and responsibilities
- Essential skills

Pathway 4: Electrical / Electronics

Competence qualifications available to this pathway:

C1 - UK Standard for Professional Engineering Competence (Incorporated Engineer)

C2 - Level 4 NVQ Extended Diploma in Engineering Manufacture (QCF)

Knowledge qualifications available to this pathway:

K1 - BEng (Hons) Electrical and Electronic Engineering

K2 - BEng (Hons) top-up Integrated Engineering (Electrical)

K3 - BEng (Hons) top-up Integrated Engineering (Mechanical)

K4 - BEng (Hons) Industrial Engineering

Combined qualifications available to this pathway:

N/A

This pathway also contains information on:

- Employee rights and responsibilities
- Essential skills

Pathway 5: Maintenance

Competence qualifications available to this pathway:

C1 - UK Standard for Professional Engineering Competence (Incorporated Engineer)

C2 - Level 4 NVQ Extended Diploma in Engineering Manufacture (QCF)

Knowledge qualifications available to this pathway:

K1 - BEng (Hons) Mechanical Engineering

K2 - BEng (Hons) Engineering (Mechanical)

K3 - BEng (Hons) Manufacturing Engineering

K4 - BEng (Hons) top-up Integrated Engineering (Electrical)

K5 - BEng (Hons) top-up Integrated Engineering (Mechanical)

K6 - BEng (Hons) Industrial Engineering

Combined qualifications available to this pathway:

N/A

This pathway also contains information on:

- Employee rights and responsibilities
- Essential skills

Pathway 6: Automotive

Competence qualifications available to this pathway:

C1 - UK Standard for Professional Engineering Competence (Incorporated Engineer)

C2 - Level 4 NVQ Extended Diploma in Engineering Manufacture (QCF)

Knowledge qualifications available to this pathway:

K1 - BEng (Hons) in Applied Engineering

K2 - BEng (Hons) Industrial Engineering

Combined qualifications available to this pathway:

N/A

This pathway also contains information on:

- Employee rights and responsibilities
- Essential skills

Framework information

Information on the Publishing Authority for this framework:

SEMTA

The Apprenticeship sector for occupations in science, engineering and manufacturing technologies.

Issue number: 3	**This framework includes:**
Framework ID: FR03160	Level 6
Date this framework is to be reviewed by: 31/12/2015	This framework is for use in: **Wales**

Short description

The Higher Apprenticeship framework for Advanced Manufacturing at Level 6 has been designed to provide the manufacturing and engineering sector in Wales with high grade engineers. Higher Apprentices will develop higher level practical skills, combined with an honours degree and they will achieve Incorporated Engineer status. They will undertake higher-level engineering occupations in one of six fields: Aerospace, Nuclear, Mechanical, Electrical/Electronics, Maintenance or Automotive.

Contact information

Proposer of this framework

This framework, with its Level 4 counterpart, has been developed by a Consortium of Manufacturing Sector Skills / Sector Skills Bodies comprising Semta, Cogent, Proskills & Improve, and the following companies and their supply chains - BAE Systems, Rolls Royce, Airbus, Aircelle, North West Aerospace Alliance, GKN, John Huddleston Engineering, E Harding & Sons, Siemens, Jaguar Landrover, Ford, Bentley Motors, Remploy, Pilkington, and The Manufacturing Institute.

Developer of this framework

Name:	Bonita Searle-Barnes
Organisation:	Semta, on behalf of the Manufacturing Consortium
Organisation type:	Sector Skills Council
Job title:	Technical Specialist
Phone:	01923 238441
Email:	frameworks@semta.org.uk
Postal address:	Semta Unit 2, The Orient Centre Greycaine Road Watford Herts WD24 7GP
Website:	www.semta.org.uk

Issuing Authority's contact details

Issued by:	
Issuer contact name:	
Issuer phone:	
Issuer email:	

Revising a framework

Contact details

Who is making this revision:	Bonita Searle-Barnes
Your organisation:	Semta
Your email address:	frameworks@semta.org.uk

Why this framework is being revised

The framework is being revised to include changes to competency qualifications in all the occupational pathways in order to meet Awarding Organisations and employers needs.

Summary of changes made to this framework

The new framework reflects the amended level 4, 5, 6 & 7 SASW Higher Apprenticeship requirements

Pathway 1: Aerospace

- One new competence qualification has been added

Pathway 2: Nuclear Related Technology

- One new competence qualification has been added

Pathway 3: Mechanical

- One new competence qualification has been added

Pathway 4: Electrical/Electronics

- One new competence qualification has been added

Pathway 5: Maintenance

- One new competence qualification has been added

Pathway 6: Automotive

- One new competence qualification has been added

Qualifications removed

None

Qualifications added

Pathway 1: Aerospace

- C2c - ETC Awards Level 4 NVQ Extended Diploma in Engineering Manufacture (QCF) 601/1863/5

Pathway 2: Nuclear Related Technology

- C2c - ETC Awards Level 4 NVQ Extended Diploma in Engineering Manufacture (QCF) 601/1863/5

Pathway 3: Mechanical

- C2c - ETC Awards Level 4 NVQ Extended Diploma in Engineering Manufacture (QCF) 601/1863/5

Pathway 4: Electrical/Electronics

- C2c - ETC Awards Level 4 NVQ Extended Diploma in Engineering Manufacture (QCF) 601/1863/5

Pathway 5: Maintenance

- C2c - ETC Awards Level 4 NVQ Extended Diploma in Engineering Manufacturing (QCF) 601/1863/5

Pathway 6: Automotive

- C2c - ETC Awards Level 4 NVQ Extended Diploma in Engineering Manufacturing (QCF) 601/1863/5

Qualifications that have been extended

None

Purpose of this framework

Summary of the purpose of the framework

The Higher Apprenticeship framework for Advanced Manufacturing at Level 6 has been designed to provide the manufacturing and engineering sector in Wales with high grade engineers. Higher apprentices will develop higher level practical skills, combined with an Honours Degree and they will achieve Incorporated Engineer status.

The manufacturing sector is broader than the remit of any single Sector Skills Council (SSC), therefore, we have worked together as a consortium of SSCs to address this important skills need:

Cogent: chemical manufacturing, nuclear science, oil and gas extraction (also includes process technology, bioscience, polymer and sign making)

Improve: food and drink manufacturing and processing

Proskills: printing, mineral extraction and processing, health and safety and process and manufacturing of furniture, glass, ceramics, coatings and paper (also includes glazing, building products, wood and mining)

Semta: Science, engineering and manufacturing.

Profile of the Advanced Manufacturing sector in Wales

The manufacturing sector in Wales employs approximately 133,000 people across nearly 6,000 establishments, with an estimated 80,000 engineers, scientists and technologists working across the manufacturing sectors. Of these technical roles, just over a quarter (22,600) are employed in higher-level technical roles made up of 4,800 technicians, 7,400 professional engineers and 10,400 engineering managers.

The main sub-occupations within the higher-level technical occupations are:

- Technicians - engineering technicians, draughtspersons, laboratory technicians, electrical and electronics technicians and quality assurance technicians
- Professionals – mechanical engineers, electrical engineers, design and development engineers, production and process engineers and planning and quality control engineers
- Managers – production, works and maintenance managers, research and development managers and quality assurance managers

• Just over half of this workforce is qualified to NVQ level 4 or equivalent and above which leaves just under half with qualifications below Level 4 or the equivalent
• The workforce is predominantly white, male, with around 86% aged in the 25 – 60 range, which means that the workforce is aging
• There are around 400 vacancies per year with employers reporting around 100 of these vacancies being hard to fill as one third of applicants did not have the required technical and practical skills
• Around 4,400 employees have skills gaps in higher-level occupations in the manufacturing sector made up of 1,280 technicians, 970 professionals and 2,150 managers.

Welsh speaking apprentices may have opportunities to learn through the medium of the Welsh language. A Good Practice Guide for sector and standard setting bodies has been published by the Welsh Government to assist in determining the demand for Welsh language skills, Welsh translations of national occupational standards and vocational qualifications through the medium of Welsh. The guide can be found on the Welsh Government website at: http://wales.gov.uk/topics/educationandskills/qualificationsin_wales/welshmedium/welshmediumguidance/

Challenges facing the Advanced Manufacturing sector

• There is a demand from employers to increase the number of employees with Higher level skills in order to increase productivity and for them to remain competitive
• The workforce is aging and 3,400 higher-level technical workers (690 per annum) are required over the period 2012-2016 to replace those retiring in Wales
• Despite the recession, manufacturing employers still show a substantial demand for new recruits. In 2009, 3% of manufacturing establishments in Wales had vacancies for higher-level occupations. Of those manufacturing sites with vacancies for higher-level occupations:

- 16% had vacancies for technicians
- 7% had vacancies for professionals
- 12% had vacancies for managers

• There are 400 higher-level vacancies, made up of 70 technicians, 190 professionals and 140 managers
• Employers experiencing difficulties in filling higher-level occupations report that this impacts on their business by increasing the workload for other staff, increases operating costs, difficulties introducing new working practices and in meeting quality standards, delays in developing new products and services and loss of business orders to competitors
• The incidence of higher-level occupational skills gaps in the manufacturing sector increases by size of establishment, ranging from 4% of micro-sized establishments, 13% of SMEs and

47% of large establishments
• The importance of higher-level technical roles to manufacturing is growing. In 2001, higher-level technical roles made up 13% of total manufacturing employment. By 2010 this figure was 17%. This trend is expected to continue, with jobs in medium to low-level skilled craft and operator occupations projected to decrease their share of total employment during 2012 to 2016.

• For those establishments with higher-level technical skills gaps, it is expected that staff would mainly need to acquire new skills or knowledge in the next 12 months as a result of introducing new working practices, developing new products or services, and the introduction of new technologies or equipment
• Between 2012 to 2016, there is expected to be a net requirement across the manufacturing sectors in Wales for 3,400 higher-level technical roles (600 technicians, 1,000 professional engineers and 1,800 engineering managers). This would equate to a total annual requirement for 690 people (130 technicians, 200 professionals engineers and 360 engineering managers). The majority of this requirement will be due to retirements (12% of the current workforce in higher-level technical occupations is aged 60 plus).

In order to meet the challenges to fill higher-level occupational skills gaps, manufacturing employers have increased training activity/spend or they are increasing and expanding trainee programmes, such as apprenticeships.

Employers and Professional Institutions are supporting this Level 6 Higher Apprenticeship in Advanced Manufacturing because it:

- has been designed with the help of employers, using the set of competencies for Incorporated Engineers produced by the Engineering Council in its UK Specification document that most closely meet their needs for higher level Engineering Technicians, Incorporated Technicians and Chartered Engineers
- provides a cost effective, comprehensive package of qualifications, rather than using stand alone qualifications
- acts as an alternative entry route into the sector, attracting a more diverse range of applicants with a range of skillsets and will help to address the issues of an aging workforce
- provides a progression route from the Level 4 Higher Apprenticeship in Advanced Manufacturing to aid retention
- is endorsed by IMechE, IET and the Royal Aeronautical Society (RAeS) to meet their sectors needs for professional registration as Incorporated Engineer.

The framework design at Level 6 takes into account the general requirements of the Specification for Apprenticeship Standards for Wales (SASW), only departing from the specification in terms of the 'competence' and 'knowledge' elements where employers have been clear as to their requirements.

Manufacturing employers have defined Level 6 knowledge requirements to be accredited honours degrees; however a combination of the Pearson HNC, HND and Level 6 Extended Diploma qualification is being investigated as an option for future issues of this framework.

There are currently six pathways in this framework covering a wide range of job roles in advanced manufacturing and engineering and which broadly fit into the following higher-level technical occupations at Level 6:

Aerospace:

- Mechanical Engineer
- Manufacturing Engineer
- Controls Engineer (Mechanical Testing)
- Production Engineer
- Mechanical Systems Engineer
- Quality Manager (Thermal development)
- Environmental Test Engineer (Defence)

Nuclear

- Mechanical Engineer
- Manufacturing Engineer
- Controls Engineer (Mechanical Testing)
- Production Engineer
- Mechanical Systems Engineer
- Quality Manager (Thermal development)
- Environmental Test Engineer (Defence)

Mechanical

- Manufacturing Engineer
- Controls Engineer (Mechanical Testing)
- Production Engineer
- Mechanical Systems Engineer
- Quality Manager (Thermal development)
- Environmental Test Engineer (Defence)

Electrical/electronics

- Electronics Production Engineer
- Electrical/Electronics Engineer (Aerospace Computer Systems)
- Electrical/Electronics Engineer (Wind Power)
- Motorsport Electrical /Electronics Engineer
- Electronics Development Engineer
- Analogue / Rf Design Engineer
- Acoustic Design Engineer

Maintenance

- Mechanical Maintenance Engineer
- Electrical/Electronics Maintenance Engineer
- Systems Maintenance Engineer
- Senior Electrical Maintenance Technician
- Senior Maintenance Planning Technician
- Nuclear Maintenance Engineer
- Biomedical Equipment Maintenance Specialist
- Senior Field Service Technician

Automotive

- Production Engineer
- Automotive Engineer (Design)
- Automotive Engineer (Development)
- Senior Manufacturing Technician
- Motorsport Senior Technician (Mechanical)
- Motorsport Senior Technician (Electrical / Electronics)

Aims and objectives of this framework (Wales)

The aim of this Level 6 framework is to provide the manufacturing and engineering sector in Wales with high grade technicians and engineers who possess practical skills, combined with a higher education qualification to meet the skills needs of employers and to help them to improve productivity and remain competitive.

The objectives are to:

- provide apprentices with the technical knowledge, skills and competence at level 6 in one framework to operate at higher technician and engineer level in manufacturing and engineering
- meet the needs of large companies and SMEs working in partnership with training providers, FE colleges and HEIs
- attract learners who wish to gain a higher education qualification while receiving a salary through a work based learning route
- attract learners from diverse backgrounds to help address the equality and diversity challenges faced by the sector, including those of an ageing workforce
- develop apprentices employability skills making them more attractive to all employers whichever career they choose
- help improve recruitment and retention rates within the industry by offering appropriate career progression into higher level jobs and training and working towards Incorporated Engineer status by offering appropriate career progression into high level jobs and training.

Entry conditions for this framework

The Higher Apprenticeship framework for Advanced Manufacturing at Level 6 is primarily suitable for applicants who have already completed the Higher Apprenticeship in Advanced Manufacturing framework at Level 4.

Applicants who have not completed the Higher Apprenticeship in Advanced Manufacturing at Level 4:

- must have previous experience of working at Level 4 in the industry
- would be expected to complete the NVQ Level 4 Extended Diploma in Engineering Manufacture (QCF) at the start of the programme, prior to embarking on the Engineering Council's UK spec
- must be able to satisfy entry criteria that would allow mid programme entry to the honours degrees described in the pathways.

Please note: Applicants for this apprenticeship framework are likely to be 19+ years.

Initial Assessment
It is highly likely that applicants will be asked to undertake a variety of tests which will include English, Maths, spatial awareness and problem solving, supported by an interview. These are not a meant as a barrier to entry but more to gauge the ability of the applicant to achieve the programme and to tailor the individual learning plan to meet their needs and those of the employer.

Rules to avoid the need to repeat qualifications
Processes exist to make sure that applicants with relevant prior knowledge, qualifications and/or experience are not disadvantaged by having to repeat learning. Training providers, awarding organisations, colleges and universities will be able to advise on the current rules for accrediting prior learning and recognising prior experience. Refer to the on and off-the-job training sections for more detail of prior learning and experience. There are no relaxations or proxies for any qualifications specified in a framework in SASW, however providers are encouraged to identify additional on-the-job training programmes that customise the learning to the new workplace.

Essential Skills Wales
Key skills are accepted as alternatives to Essential Skills Wales qualifications, provided the Key Skills Certificate(s) attained are at the same level(s) as those specified for Essential Skills Wales Qualifications. However Key Skills can not be completed as part of this framework.

It is a requirement that entrants should have completed the Essential Skills in Communication and Application of Number at Level 2 on entry to the framework. These could be achieved either through completing Essential/Key Skills at Level 2, or GCSEs / O levels grade C or above

or A levels in the required subjects. However if apprentices have successfully completed the Higher Apprenticeship in Advanced Manufacturing at Level 4, they do not need to repeat Essential Skills Wales for Communication, Application of Number and ICT, the Wider Key Skills of Improving Own Learning and Performance and Working with Others, or ERR for this Level 6 framework.

Essential Skills Wales qualifications achieved in the context of the Welsh Baccalaureate Qualification (WBQ) can be accepted, provided the specific certification of the title(s) and level(s) of those ESW qualifications is provided. The WBQ certificate itself does not provide this specific evidence.

Knowledge qualifications
If an applicant has the whole relevant knowledge qualification (see qualifications page - Knowledge) before starting their apprenticeship, they may count this and will not have to repeat the qualification providing they have achieved this qualification within five years of starting their apprenticeship. Furthermore, the hours that were spent gaining the qualification may be counted towards the total hours for the apprenticeship.

Competence qualifications
If applicants have already achieved the NVQ Level 4 Extended Diploma in Engineering Manufacture (QCF) they will not be required to repeat it providing they have achieved this qualification within five years of starting their apprenticeship. The hours that were spent gaining the competence qualification may be counted towards the total hours for the apprenticeship.

It is important that there is agreement between the employer and the apprentice that the applicant is currently competent. However if they have no record of competence, they will have to undertake the relevant competence qualification as a prerequisite before undertaking the competencies described within the UK Spec.

Wider Key Skills
Wider Key Skills qualifications achieved in the context of the Welsh Baccalaureate Qualification (WBQ) can be accepted, provided the specific certification of the title(s) and level(s) of those qualifications is provided. The WBQ certificate does not provide this specific evidence.

Accrediting prior experience in the sector
Applicants that are already working in the sector or who have recently worked in the sector can apply to have their experience formally recognised by an Awarding Organisation and this will count towards the qualifications in this framework.

Level 6

Title for this framework at level 6

Higher Apprenticeship in Advanced Manufacturing Level 6

Pathways for this framework at level 6

Pathway 1:	Aerospace
Pathway 2:	Nuclear Related Technology
Pathway 3:	Mechanical
Pathway 4:	Electrical / Electronics
Pathway 5:	Maintenance
Pathway 6:	Automotive

Level 6, Pathway 1: Aerospace

Description of this pathway

Aerospace:

Total minimum of 497 credits made up from:

Competence: NVQ Level 4 Extended Diploma in Engineering Manufacture (QCF) = 107 credits

Essential Skills Wales 3 x 6 credits =18 credits

Wider Key Skills 2 x 6 credits = 12 credits

Knowledge = 360 credits (FHEQ)

Professional recognition as an Incorporated Engineer

UK Standard for Professional Engineering Competence (Incorporated Engineer)
The competencies specified in the UK Spec are based on occupational standards developed for the main industries and services in which engineers are employed. There are no estimates as to the training hours required to complete the competence standards for IEng as it will vary widely between candidates depending on their previous competence training and experience.

Registration is open to everyone who can demonstrate competence to perform professional work to the necessary standards and commitment to:

- maintain their competence
- work within professional codes
- participate actively within the profession.

Anyone wishing to be registered must apply through one of the professional engineering institutions licensed by the Engineering Council (see www.engc.org.uk/ for a current list).

Candidates who believe they measure up to this Standard, or who wish to work towards registration, should approach one of the listed engineering institutions to obtain further details of how to apply for recognition and registration. The assessment process - known as a professional review - normally takes from one to six months, depending on the extent to which education and training is found to meet the standard requirements, the size of the chosen professional engineering institution and the availability of experienced assessors familiar with the branch of technology in which the applicant works.

The process of assessment starts with a written application made in accordance with the requirements of the particular institution concerned. A detailed description of the format for this will be provided by the institution, but any claim of qualifications, experience or training will need formal documented evidence. In submitting details, applicants will need to show how this relates to the required competences.

What is professional competence?
Professional competence integrates knowledge, understanding, skills and values. It goes beyond the ability to perform specific tasks. The formation process through which engineering professionals become competent generally involves a combination of formal education and further training and experience (generally known as professional development). However these different elements are not necessarily separate or sequential and they may not always be formally structured.

Pages 8 to 27 of the UK Standard For Professional Engineering Competence set out the threshold generic competence standard for registration as an Engineering Technician, Incorporated Engineer or Chartered Engineer, and include some examples of the kind of evidence which would help demonstrate these. The exemplifying educational requirements for each category of registration are also given. The standard has widespread support and is based on occupational standards developed for the main industries and services in which engineers are employed.

Assessment of competence
To become registered, applicants must have their competence assessed through a process known as professional review. The assessment is by practising engineering professionals, trained in this kind of assessment. Applicants are assessed against the competence standards listed in the UK Standard For Professional Engineering Competence document, which may be adapted by the institution to relate specifically to the particular technologies or industries with which it is concerned.

Mentorship
Each apprentice must have an appointed mentor at the start of training to advise them on the evidence they need to accumulate to meet the Incorporated Engineer Standard. In large

engineering companies there are Chartered Engineers who can perform this role. Apprentices should receive regular reviews by their mentor at least on a quarterly basis to ensure progress is properly monitored. Those apprentices who work for small and medium sized companies should contact their Institution to arrange mentorship.

Recording of evidence

Each apprentice must develop a portfolio of evidence he or she has accumulated against the Incorporated Engineer Standard. Most Institutions have an electronic portfolio format that apprentices may use to record progress and evidence against the standard. The types of evidence may be varied but could include the following:

- Work-based assignments
- Practical tests
- Examinations
- Work based projects
- Dissertations

Apprentices should identify arrangements for evidence recording and mentorship on joining the institution of their choice. The Institute of Mechanical Engineers (IMechE), the Institution of Engineering and Technology (IET) and the Royal Aeronautical Society (RAeS) endorse this framework and will be able to offer advice and guidance. The process is as follows:

1. Professional Engineering Institution approves the Higher Apprenticeship framework at Level 6
2. Apprentice applies for membership and joins an appropriate professional engineering institution
3. Institution allocates a mentor and supplies any related information, plus access to a PD record system where available
4. Apprentice accumulates relevant evidence against the UK-SPEC (IEng) competence requirements through their working experience and the vocational qualification element of their programme. The mentor provides advice on how to keep an appropriate record of this and, in due course, on completing the application for IEng
5. Apprentice submits IEng application to the Institution, who review the application and may request further details of experience or other supporting evidence
6. At either of these stages, the apprentice may be advised of any shortfall allowing the apprentice to address this
7. Apprentice invited to attend a Professional Review interview
8. Apprentice is awarded IEng or advised how to address any shortfall.

Other useful forms of reference

The Engineering Council is the UK regulatory body for the engineering profession. EC UK hold the national registers of 235,000 Engineering Technicians (EngTech), Information and

Communications Technology Technicians (ICTTech), Incorporated Engineers (IEng) and Chartered Engineers (CEng).

Web-links:
http://www.engc.org.uk/engcdocuments/internet/Website/Student%20guide%20to%20professional%20registration.pdf

http://www.engc.org.uk/

www.engc.or g.uk/professional-registration/standards/uk-spec

www.theiet.org/

www.imeche.org

http://www.aerosociety.com/

Entry requirements for this pathway in addition to the framework entry requirements

There are no additional requirements other than the general entry conditions

Job title(s)	Job role(s)
Electrical / Electronic Engineer (Aerospace Computer Systems)	Development, manufacture and testing of electrical / electronic components for use in Aerospace platforms, including instrumentation & power systems, ensuring compliance with relevant standards and quality requirements
Software Engineer (Aerospace Computer Systems)	Development, coding, testing and implementation of software systems & protocols for use in aerospace platforms
Systems Engineer (Aerospace Computer Systems)	Development, implementation and testing of aircraft systems for use in cockpit, power, and distributed computing, ensuring compliance with relevant standards and quality requirements
Electrical/ Electronic Engineer	Design, building and testing of aerospace integrated electronic systems ensuring compliance with relevant standards and quality requirements
Systems Engineer	Design, assembly and test of avionic integrated systems, programmes and components
Systems Operations Engineer	Customer-facing aerospace operational electrical and avionic testing and fault finding
Aircraft Systems Development Engineer	Development of design specifications, prototyping and testing of new aircraft systems: mechanical, electrical, avionic, electronic, pneumatic or hydraulic
Manufacturing Engineer	Development and optimisation of manufacturing processes and systems to meet manufacturing requirements
Quality Engineer	Design, test, and supervise the manufacture of aircraft, spacecraft, and missiles. Disciplines include aerodynamics, propulsion, avionics, material science, structural analysis and advanced manufacturing

Qualifications

Competence qualifications available to this pathway

C1 - UK Standard for Professional Engineering Competence (Incorporated Engineer)

No.	Ref no.	Awarding organisation	Credit value	Guided learning hours	UCAS points value
C1a	N/A	Institute of Mechanical Engineers (IMechE)	N/A	Various	N/A
C1b	N/A	Institute of Engineering and Technology (IET)	N/A	Various	N/A
C1c	N/A	Royal Aeronautical Society (RAeS)	N/A	Various	N/A

C2 - Level 4 NVQ Extended Diploma in Engineering Manufacture (QCF)

No.	Ref no.	Awarding organisation	Credit value	Guided learning hours	UCAS points value
C2a	600/9529/5	City & Guilds	107	461	N/A
C2b	600/9576/3	EAL	107	461	N/A
C2c	601/1863/5	ETC Awards Ltd	107	461	N/A

Knowledge qualifications available to this pathway

K1 - B Eng (Hons) Aeronautical and Mechanical Engineering

No.	Ref no.	Awarding organisation	Credit value	Guided learning hours	UCAS points value
K1a	HH34	Glyndwr University (3rd year of entry)	HE 360	N/A	

K2 - BSc (Hons) Computer Systems Integration

No.	Ref no.	Awarding organisation	Credit value	Guided learning hours	UCAS points value
K2a	G 402	University of West England (3rd year of entry)	HE 360	N/A	

K3 - BSc (Hons) Engineering

No.	Ref no.	Awarding organisation	Credit value	Guided learning hours	UCAS points value
K3a	H110	University of West England (3rd year of entry)	HE 360	N/A	

K4 - BEng (Hons) Engineering (Mechanical)

No.	Ref no.	Awarding organisation	Credit value	Guided learning hours	UCAS points value
K4a	H303	Sheffield Hallam University (3rd year of entry)	HE 360	N/A	

Knowledge qualifications available to this pathway (cont.)

K5 - BEng (Hons) Mechanical Engineering					
No.	**Ref no.**	**Awarding organisation**	**Credit value**	**Guided learning hours**	**UCAS points value**
K5a	H300	Sheffield Hallam University (3rd year of entry)	HE 360	N/A	

Combined qualifications available to this pathway

N/A

Relationship between competence and knowledge qualifications

Note that both C1 and C2 are required for this pathway.

K1 – K5 provide underpinning knowledge for C1 and C2

The designated degrees underpin the knowledge elements of the competence qualification in this pathway. The knowledge qualifications deliver essential underpinning knowledge which supports the fundamental scientific and mathematical principles that equip apprentices with the understanding required to operate effectively and efficiently at a high level within this sub-sector.

Employers will select the knowledge qualification relevant to the job role of the Higher Apprentice. Note that maths options must be included as part of the knowledge qualifications as this is a requirement of the job.

Delivery methods for knowledge based qualifications may vary, from a conventional university based environment, to delivery through a combination of conventional and written/web-based/ distance learning materials.

Transferable skills (Wales)

Essential skills (Wales)

	Minimum level	Credit value
Communication	2	6
Application of numbers	2	6
IT	2	6

Progression routes into and from this pathway

Progression routes into this pathway include those who:

- have completed the Higher Apprenticeship in Advanced Manufacturing at Level 4 and
- have undertaken a relevant Foundation Degree linked to the Honours degrees listed in this framework
- have completed a relevant HNC/HND that links to the Honours degrees listed in this framework
- have completed the relevant engineering honours degree but do not have Incorporated Engineer status
- have completed the Level 4 NVQ Extended Diploma in Engineering Manufacture (QCF)

Progression from this pathway for those who have completed a Higher Apprenticeship in Advanced Manufacturing (Level 6) in Aerospace:

- employment as an engineer in the job roles stated in this framework or similar job roles
- Masters Degrees in the relevant specialism
- monitored Professional Development to achieve Chartered Engineer Registration.

To get more information on careers and job opportunities for Incorporated Engineers in the Aerospace sector we recommend you visit these websites:
http://www.aeroso ciety.com/Careers-Education/aerospacecareer

www.careersinaerospace.com

http://www.engc.org.uk/ukspec.aspx

www.engc.org.uk/

www.theiet.org/

www.imeche.org

UCAS points for this pathway: N/A

Employee rights and responsibilities

There are two methods of achieving ERR as set out below:

Method 1 - Qualifications

1a. EAL have produced a stand-alone qualification that covers all 9 outcomes of ERR requirements.

Qualification details:
EAL Level 2 Award in Employment Rights and Responsibilities for new Entrants into the Science, Engineering and Manufacturing Sectors (QCF)
QCF qualification ref no: 600/0290/6
Credit value: 5 credits
Training hours: 41

1b. Pearson have produced a stand-alone qualification that can cover all 9 outcomes of ERR requirements if Unit 2 is achieved.

Qualification details:
Pearson BTEC Level 2 Award in WorkSkills for Effective Learning and Employment (QCF)
QCF qualification ref no: 501/1793/2
Credit value: 4 credits
Training hours: 40

Please Note: The Pearson BTEC Level 2 Award consists of a mandatory unit as an introduction to apprenticeships. Apprentices **must then complete Unit 2** which covers the ERR requirements (included within content). This qualification is designed to be assessed in the context of the sector relevant to the apprenticeship framework being undertaken (i.e. manufacturing/ engineering in this case).

1c. Pearson have produced a Level 3 stand-alone qualification that can cover all 9 outcomes of ERR requirements if Units 2 and 4 are achieved.

Qualification details:
Pearson BTEC Level 3 Award in WorkSkills for Effective Learning and Employment (QCF)
QCF qualification ref no: 501/1791/9
Credit value: 4 credits
Training hours: 40

The Pearson BTEC Level 3 Award consists of a mandatory unit as an introduction to apprenticeships. Apprentices **must then complete Units 2 and 4** which cover the ERR requirements (included within content). This qualification is designed to be assessed in the

context of the sector relevant to the apprenticeship framework being undertaken (i.e. manufacturing/engineering in this case).

Please note: Only Level 2 is required to meet the framework requirements.

1d. City & Guilds have produced a stand-alone qualification that can cover all 9 outcomes of ERR requirements.

Qualification details:
City & Guilds Level 2 Subsidiary Award in Employment and Personal Learning at Work (QCF)
QCF qualification ref no: 600/2819/1
Credit value: 2 credits
Training hours: 15

Please note: Although it may be possible to complete ERR in a minimum of 15 training hours, Semta recommend a minimum of 40 training hours are taken to complete the ERR requirements.

These qualifications will enable apprentices to both know and understand the principles associated with the nine national outcomes such as the world of work and how they are constrained by various legal and organisational procedures for their own well-being. Apprentices achieving the qualifications will have demonstrated that they have the underpinning knowledge relevant for the engineering/manufacturing environment which satisfies the Specification for Apprenticeship Standards for Wales.

Method 2 - Workbook
Semta has produced an Apprentice ERR workbook that is available from:
customercare@eal.org.uk

The requirements for completing it must be explained to the apprentice right at the start of their training in order that they may take full advantage of their *company induction where significant amounts of information towards the national outcomes will be covered. The workbook is intended to enable apprentices to know, understand and record the principles associated with the nine national outcomes such as the world of work and how they are constrained by various legal and organisational procedures for their own well-being.

***Please note:** All apprentices must receive a company induction programme.

To claim final certification of the apprenticeship, one of the preceding forms of ERR evidence will be required, together with the ACW Universal Apprentice Certificate Claim form which is available from the Federation for Industry Sector Skills and Standards (Fisss) website:
acwcerts.co.uk

Level 6, Pathway 2: Nuclear Related Technology

Description of this pathway

Nuclear Related Technology:

Total minimum of 497 credits made up from:

Competence: NVQ Level 4 Extended Diploma in Engineering Manufacture (QCF) = 107 credits

Essential Skills Wales 3 x 6 credits = 18 credits

Wider Key Skills 2 x 6 credits = 12 credits

Knowledge = 360 credits (FHEQ)

Professional recognition as an Incorporated Engineer

UK Standard for Professional Engineering Competence (Incorporated Engineer)
The competencies specified in the UK Spec are based on occupational standards developed for the main industries and services in which engineers are employed. There are no estimates as to the training hours required to complete the competence standards for IEng as it will vary widely between candidates depending on their previous competence training and experience.

Registration is open to everyone who can demonstrate competence to perform professional work to the necessary standards and commitment to:

- maintain their competence
- work within professional codes
- participate actively within the profession.

Anyone wishing to be registered must apply through one of the professional engineering institutions licensed by the Engineering Council (see www.engc.org.uk/ for a current list). Candidates who believe they measure up to this Standard, or who wish to work towards

registration, should approach one of the listed engineering institutions to obtain further details of how to apply for recognition and registration. The assessment process - known as a professional review - normally takes from one to six months, depending on the extent to which education and training is found to meet the standard requirements, the size of the chosen professional engineering institution and the availability of experienced assessors familiar with the branch of technology in which the applicant works.

The process of assessment starts with a written application made in accordance with the requirements of the particular institution concerned. A detailed description of the format for this will be provided by the institution, but any claim of qualifications, experience or training will need formal documented evidence. In submitting details, applicants will need to show how this relates to the required competences.

What is professional competence?

Professional competence integrates knowledge, understanding, skills and values. It goes beyond the ability to perform specific tasks. The formation process through which engineering professionals become competent generally involves a combination of formal education and further training and experience (generally known as professional development). However these different elements are not necessarily separate or sequential and they may not always be formally structured.

Pages 8 to 27 of the UK Standard For Professional Engineering Competence set out the threshold generic competence standard for registration as an Engineering Technician, Incorporated Engineer or Chartered Engineer, and include some examples of the kind of evidence which would help demonstrate these. The exemplifying educational requirements for each category of registration are also given. The standard has widespread support and is based on occupational standards developed for the main industries and services in which engineers are employed.

Assessment of competence

To become registered, applicants must have their competence assessed through a process known as professional review. The assessment is by practising engineering professionals, trained in this kind of assessment. Applicants are assessed against the competence standards listed in the UK Standard For Professional Engineering Competence document, which may be adapted by the institution to relate specifically to the particular technologies or industries with which it is concerned.

Mentorship

Each apprentice must have an appointed mentor at the start of training to advise them on the evidence they need to accumulate to meet the Incorporated Engineer Standard. In large engineering companies there are Chartered Engineers who can perform this role. Apprentices should receive regular reviews by their mentor at least on a quarterly basis to ensure progress is properly monitored. Those apprentices who work for small and medium sized companies

should contact their Institution to arrange mentorship.

Recording of evidence

Each apprentice must develop a portfolio of evidence he or she has accumulated against the Incorporated Engineer Standard. Most Institutions have an electronic portfolio format that apprentices may use to record progress and evidence against the standard. The types of evidence may be varied but could include the following:

- work-based assignments
- practical tests
- examinations
- work based projects
- dissertations

Apprentices should identify arrangements for evidence recording and mentorship on joining the institution of their choice. The Institute of Mechanical Engineers (IMechE), the Institution of Engineering and Technology (IET) and the Royal Aeronautical Society (RAeS) endorse this framework and will be able to offer advice and guidance. The process is as follows:

1. Professional Engineering Institution approves the Higher Apprenticeship framework at Level 6
2. Apprentice applies for membership and joins an appropriate professional engineering institution
3. Institution allocates a mentor and supplies any related information, plus access to a PD record system where available
4. Apprentice accumulates relevant evidence against the UK-SPEC (IEng) competence requirements through their working experience and the vocational qualification element of their programme. The mentor provides advice on how to keep an appropriate record of this and, in due course, on completing the application for IEng.
5. Apprentice submits IEng application to the Institution, who review the application and may request further details of experience or other supporting evidence
6. At either of these stages, the apprentice may be advised of any shortfall allowing the apprentice to address this
7. Apprentice invited to attend a Professional Review interview.
8. Apprentice is awarded IEng or advised how to address any shortfall.

Other useful forms of reference

The Engineering Council is the UK regulatory body for the engineering profession. EC UK hold the national registers of 235,000 Engineering Technicians (EngTech), Information and Communications Technology Technicians (ICTTech), Incorporated Engineers (IEng) and Chartered Engineers (CEng).

Web-links:
http://www.engc.org.uk/engcdocuments/internet/Website/Student%20guide%20to%20professional%20registration.pdf

www.engc.org.uk/

www.engc.or g.uk/professional-registration/standards/uk-spec

www.theiet.org/

www.imeche.org

Entry requirements for this pathway in addition to the framework entry requirements

There are no additional requirements other than the general entry conditions

Job title(s)	Job role(s)
Electrical/ Electronic Engineer(Nuclear)	Design, manufacture and testing of electrical / electronic components intended for use on a nuclear plant , ensuring adherence to nuclear-specific quality standards.
Control and Instrumentation Engineer (Nuclear)	Design, selection, installation and verification of sensors and related control systems for use on nuclear plant, ensuring adherence to nuclear specific quality standards.
Computer Aided Design (CAD) Engineer	Design of mechanical or electrical systems for nuclear applications using bespoke 3D packages (AutoCAD) Solidworks, Esplan, RSwire); generation of manufacturing drawings; production of Bill of Materials; validation of designs; demonstration of regulatory compliance.
Sales Engineer (Nuclear Components)	Interpreting customer technical requirements, specifications and standards for electrical or mechanical nuclear-related components, provision of in-service support, preparation of costings and quotes, managing customer relationships and contracts.
Process Engineer (Nuclear)	Design, operation, control and optimisation of nuclear-chemical process plant, selection, installation of control systems (e.g. PLC SCADA); compliance with nuclear specific quality and regulatory requirements.
Safety/Performance Engineer (Nuclear)	Application of risk assessment methodologies to nuclear plant including HAZAN, HAZOP, FMEA, PSA; Development of nuclear safety case and regulatory compliance statements.
Manufacturing Engineer (Nuclear)	Development and optimisation of manufacturing processes and systems, application of manufacturing codes and standards pertaining to the nuclear industry.
Stress Engineer (Nuclear)	Applying stress analysis techniques to metal and composite components used in nuclear applications, including pressure vessels; application of Finite Element Analysis software packages, development and optimisation of physical stress analysis and NDT techniques.

Qualifications

Competence qualifications available to this pathway

C1 - UK Standard for Professional Engineering Competence (Incorporated Engineer)					
No.	**Ref no.**	**Awarding organisation**	**Credit value**	**Guided learning hours**	**UCAS points value**
C1a	N/A	Institute of Mechanical Engineers (IMechE)	N/A	Various	N/A
C1b	N/A	Institute of Engineering and Technology	N/A	Various	N/A

C2 - Level 4 NVQ Extended Diploma in Engineering Manufacture (QCF)					
No.	**Ref no.**	**Awarding organisation**	**Credit value**	**Guided learning hours**	**UCAS points value**
C2a	600/9529/5	City & Guilds	107	461	N/A
C2b	600/9576/3	EAL	107	461	N/A
C2c	601/1863/5	ETC Awards Ltd	107	461	N/A

Knowledge qualifications available to this pathway

K1 - BEng (Hons) Engineering (Mechanical)					
No.	**Ref no.**	**Awarding organisation**	**Credit value**	**Guided learning hours**	**UCAS points value**
K1a	H303	Sheffield Hallam University (3rd year of entry)	HE 360	N/A	

Knowledge qualifications available to this pathway (cont.)

K2 - BEng (Hons) Mechanical Engineering

No.	Ref no.	Awarding organisation	Credit value	Guided learning hours	UCAS points value
K2a	H300	Manchester Metropolitan University (3rd year of entry)	HE 360	N/A	

K3 - B Eng (Hons) Mechanical Engineering

No.	Ref no.	Awarding organisation	Credit value	Guided learning hours	UCAS points value
K3a	H300	Liverpool John Moores University (4th Year of entry)	HE 360	N/A	

K4 - BEng (Hons) Industrial Engineering

No.	Ref no.	Awarding organisation	Credit value	Guided learning hours	UCAS points value
K4a	H700	Glyndwr University (3rd year of entry)	HE 360	N/A	

Combined qualifications available to this pathway

N/A

Relationship between competence and knowledge qualifications

Note that both C1 and C2 are required for this pathway.

K1 - K4 provide underpinning knowledge for C1 and C2

The designated degrees underpin the knowledge elements of the competence qualification in this pathway. The knowledge qualifications deliver essential underpinning knowledge which supports the fundamental scientific and mathematical principles that equip apprentices with the understanding required to operate effectively and efficiently at a high level within this sub-sector.

Employers will select the knowledge qualification relevant to the job role of the Higher Apprentice. Note that maths options must be included as part of the knowledge qualifications as this is a requirement of the job.

Delivery methods for knowledge based qualifications may vary, from a conventional University based environment, to delivery through a combination of conventional and written/web-based/ distance learning materials.

Transferable skills (Wales)

Essential skills (Wales)

	Minimum level	Credit value
Communication	2	6
Application of numbers	2	6
IT	2	6

Progression routes into and from this pathway

Progression routes into this pathway include those who:

- have completed the Higher Apprenticeship in Advanced Manufacturing at Level 4 and
- have undertaken a relevant Foundation Degree linking to the Honours degrees listed in the framework for this pathway
- have completed a relevant HNC/HND that links to the Honours degrees listed
- have completed the relevant engineering honours degree but do not have Incorporated Engineer status
- have completed the Level 4 NVQ Extended Diploma in Engineering Manufacture (QCF)

Progression from this pathway for those who have completed a Higher Apprenticeship in Advanced Manufacturing (Level 6) in Nuclear Related Technology:

- employment as an engineer in the job roles stated in this framework or similar job roles
- Masters Degree in the relevant specialism
- monitored Professional Development to achieve Chartered Engineer Registration.

To get more information on careers and job opportunities for Incorporated Engineers in the Nuclear sector we recommend you visit these websites::

http://www.cogent-ssc.co m/industry/nuclear/nitfjs.php

http://www.nuclearsectorjobs.co.uk/

www.engc.org.uk/

http://www.theiet.org/

http://www.imeche.org/

UCAS points for this pathway: N/A

Employee rights and responsibilities

There are two methods of achieving ERR as set out below:

Method 1 - Qualifications

1a. EAL have produced a stand-alone qualification that covers all 9 outcomes of ERR requirements.

Qualification details:
EAL Level 2 Award in Employment Rights and Responsibilities for new Entrants into the Science, Engineering and Manufacturing Sectors (QCF)
QCF qualification ref no: 600/0290/6
Credit value: 5 credits
Training hours: 41

1b. Pearson have produced a stand-alone qualification that can cover all 9 outcomes of ERR requirements if Unit 2 is achieved.

Qualification details:
Pearson BTEC Level 2 Award in WorkSkills for Effective Learning and Employment (QCF)
QCF qualification ref no: 501/1793/2
Credit value: 4 credits
Training hours: 40

Please Note: The Pearson BTEC Level 2 Award consists of a mandatory unit as an introduction to apprenticeships. Apprentices **must then complete Unit 2** which covers the ERR requirements (included within content). This qualification is designed to be assessed in the context of the sector relevant to the apprenticeship framework being undertaken (i.e. manufacturing/ engineering in this case).

1c. Pearson have produced a Level 3 stand-alone qualification that can cover all 9 outcomes of ERR requirements if Units 2 and 4 are achieved.

Qualification details:
Pearson BTEC Level 3 Award in WorkSkills for Effective Learning and Employment (QCF)
QCF qualification ref no: 501/1791/9
Credit value: 4 credits
Training hours: 40

The Pearson BTEC Level 3 Award consists of a mandatory unit as an introduction to apprenticeships. Apprentices **must then complete Units 2 and 4** which cover the ERR requirements (included within content). This qualification is designed to be assessed in the context of the sector relevant to the apprenticeship framework being undertaken (i.e.

manufacturing/engineering in this case).

Please note: Only Level 2 is required to meet the framework requirements.

1d. City & Guilds have produced a stand-alone qualification that can cover all 9 outcomes of ERR requirements.

Qualification details:
City & Guilds Level 2 Subsidiary Award in Employment and Personal Learning at Work (QCF)
QCF qualification ref no: 600/2819/1
Credit value: 2 credits
Training hours: 15

Please note: Although it may be possible to complete ERR in a minimum of 15 training hours, Semta recommend a minimum of 40 training hours are taken to complete the ERR requirements.

These qualifications will enable apprentices to both know and understand the principles associated with the nine national outcomes such as the world of work and how they are constrained by various legal and organisational procedures for their own well-being. Apprentices achieving the qualifications will have demonstrated that they have the underpinning knowledge relevant for the engineering/manufacturing environment which satisfies the Specification for Apprenticeship Standards for Wales.

Method 2 - Workbook
Semta has produced an Apprentice ERR workbook that is available from:
customercare@eal.org.uk

The requirements for completing it must be explained to the apprentice right at the start of their training in order that they may take full advantage of their *company induction where significant amounts of information towards the national outcomes will be covered. The workbook is intended to enable apprentices to know, understand and record the principles associated with the nine national outcomes such as the world of work and how they are constrained by various legal and organisational procedures for their own well-being.

***Please note:** All apprentices must receive a company induction programme.

To claim final certification of the apprenticeship, one of the preceding forms of ERR evidence will be required, together with the ACW Universal Apprentice Certificate Claim form which is available from the Federation for Industry Sector Skills and Standards (Fisss) website:
acwcerts.co.uk

Level 6, Pathway 3: Mechanical

Description of this pathway

Mechanical:

Total minimum of 497 credits made up from:

Competence: NVQ Level 4 Extended Diploma in Engineering Manufacture (QCF) = 107 credits

Essential Skills Wales 3 x 6 credits =18 credits

Wider Key Skills 2 x 6 credits = 12 credits

Knowledge = 360 credits (FHEQ)

Professional recognition as an Incorporated Engineer

UK Standard for Professional Engineering Competence (Incorporated Engineer)
The competencies specified in the UK Spec are based on occupational standards developed for the main industries and services in which engineers are employed. There are no estimates as to the training hours required to complete the competence standards for IEng as it will vary widely between candidates depending on their previous competence training and experience.

Registration is open to everyone who can demonstrate competence to perform professional work to the necessary standards and commitment to:

- maintain their competence
- work within professional codes
- participate actively within the profession.

Anyone wishing to be registered must apply through one of the professional engineering institutions licensed by the Engineering Council (see www.engc.org.uk/ for a current list). Candidates who believe they measure up to this Standard, or who wish to work towards

registration, should approach one of the listed engineering institutions to obtain further details of how to apply for recognition and registration. The assessment process - known as a professional review - normally takes from one to six months, depending on the extent to which education and training is found to meet the standard requirements, the size of the chosen professional engineering institution and the availability of experienced assessors familiar with the branch of technology in which the applicant works.

The process of assessment starts with a written application made in accordance with the requirements of the particular institution concerned. A detailed description of the format for this will be provided by the institution, but any claim of qualifications, experience or training will need formal documented evidence. In submitting details, applicants will need to show how this relates to the required competences.

What is professional competence?
Professional competence integrates knowledge, understanding, skills and values. It goes beyond the ability to perform specific tasks. The formation process through which engineering professionals become competent generally involves a combination of formal education and further training and experience (generally known as professional development). However these different elements are not necessarily separate or sequential and they may not always be formally structured.

Pages 8 to 27 of the UK Standard For Professional Engineering Competence set out the threshold generic competence standard for registration as an Engineering Technician, Incorporated Engineer or Chartered Engineer, and include some examples of the kind of evidence which would help demonstrate these. The exemplifying educational requirements for each category of registration are also given. The standard has widespread support and is based on occupational standards developed for the main industries and services in which engineers are employed.

Assessment of competence
To become registered, applicants must have their competence assessed through a process known as professional review. The assessment is by practising engineering professionals, trained in this kind of assessment. Applicants are assessed against the competence standards listed in the UK Standard For Professional Engineering Competence document, which may be adapted by the institution to relate specifically to the particular technologies or industries with which it is concerned.

Mentorship
Each apprentice must have an appointed mentor at the start of training to advise them on the evidence they need to accumulate to meet the Incorporated Engineer Standard. In large engineering companies there are Chartered Engineers who can perform this role. Apprentices should receive regular reviews by their mentor at least on a quarterly basis to ensure progress is properly monitored. Those apprentices who work for small and medium sized companies

should contact their Institution to arrange mentorship.

Recording of evidence

Each apprentice must develop a portfolio of evidence he or she has accumulated against the Incorporated Engineer Standard. Most Institutions have an electronic portfolio format that apprentices may use to record progress and evidence against the standard. The types of evidence may be varied but could include the following:

- work-based assignments
- practical tests
- examinations
- work based projects
- dissertations

Apprentices should identify arrangements for evidence recording and mentorship on joining the institution of their choice. The Institute of Mechanical Engineers (IMechE), the Institution of Engineering and Technology (IET) and the Royal Aeronautical Society (RAeS) endorse this framework and will be able to offer advice and guidance. The process is as follows:

1. Professional Engineering Institution approves the Higher Apprenticeship framework at Level 6
2. Apprentice applies for membership and joins an appropriate professional engineering institution
3. Institution allocates a mentor and supplies any related information, plus access to a PD record system where available
4. Apprentice accumulates relevant evidence against the UK-SPEC (IEng) competence requirements through their working experience and the vocational qualification element of their programme. The mentor provides advice on how to keep an appropriate record of this and, in due course, on completing the application for IEng.
5. Apprentice submits IEng application to the Institution, who review the application and may request further details of experience or other supporting evidence
6. At either of these stages, the apprentice may be advised of any shortfall allowing the apprentice to address this
7. Apprentice invited to attend a Professional Review interview.
8. Apprentice is awarded IEng or advised how to address any shortfall.

Other useful forms of reference

The Engineering Council is the UK regulatory body for the engineering profession. EC UK hold the national registers of 235,000 Engineering Technicians (EngTech), Information and Communications Technology Technicians (ICTTech), Incorporated Engineers (IEng) and Chartered Engineers (CEng).

Web-links:

http://www.engc.org.uk/engcdocuments/internet/Website/Student%20guide%20to%20professional%20registration.pdf

www.engc.org.uk/

www.engc.or g.uk/professional-registration/standards/uk-spec

www.theiet.org/

www.imeche.org

http://www.aerosociety.com/

Entry requirements for this pathway in addition to the framework entry requirements

There are no additional requirements other than the general entry conditions

Job title(s)	Job role(s)
Mechanical Engineer	Applies the principles of physics and materials science for analysis, design, manufacturing, and maintenance of mechanical equipment and systems.
Manufacturing Engineer	Setting up complex CNC production processes for manufacturing operations, ensuring wherever possible these are as 'lean' as possible.
Controls Engineer (Mechanical Testing)	Works with other engineers and managers, to discuss and develop rig and systems design and support to ensure smooth running of projects and effective delivery of the mechanical testing process
Production Engineer	Supervise and provide technical guidance to quality inspectors and junior engineering staff. Provide technical support to production and assist with product development. Solve technical issues within company and sub-contactors, suppliers and customers
Mechanical Systems Engineer	Apply scientific and mathematical principles to practical ends such as design, manufacture and operation of efficient machines, processes and systems
Quality Manager	Developing and defining project quality programme and plans. Ensuring continuous and effective operation of project quality performance and plans. Performing project quality assurance auditing of contractors and suppliers
Environmental Test Engineer (Defence)	Working knowledge of project life cycles and where compliance testing fits, In depth knowledge of Environmental qualification testing, Knowledge of temperature, shock, vibration and other EQT measuring equipment

Qualifications

Competence qualifications available to this pathway

C1 - UK Standard for Professional Engineering Competence (Incorporated Engineer)

No.	Ref no.	Awarding organisation	Credit value	Guided learning hours	UCAS points value
C1a	N/A	Institute of Mechanical Engineers (IMechE)	N/A	Various	N/A
C1b	N/A	Institute of Engineering and Technology (IET)	N/A	Various	N/A
C1c	N/A	Royal Aeronautical Society (RAeS)	N/A	Various	N/A

C2 - Level 4 NVQ Extended Diploma in Engineering Manufacture (QCF)

No.	Ref no.	Awarding organisation	Credit value	Guided learning hours	UCAS points value
C2a	600/9529/5	City & Guilds	107	461	N/A
C2b	600/9576/3	EAL	107	461	N/A
C2c	601/1863/5	ETC Awards Ltd	107	461	N/A

Knowledge qualifications available to this pathway

K1 - BEng (Hons) Mechanical Engineering

No.	Ref no.	Awarding organisation	Credit value	Guided learning hours	UCAS points value
K1a	H300	Liverpool John Moores University (4th year entry)	HE 360	N/A	

K2 - BEng (Hons) Mechanical Engineering

No.	Ref no.	Awarding organisation	Credit value	Guided learning hours	UCAS points value
K2a	H300	Manchester Metropolitan University (4th year of entry)	HE 360	N/A	

K3 - BEng (Hons) top-up Integrated Engineering (Electrical)

No.	Ref no.	Awarding organisation	Credit value	Guided learning hours	UCAS points value
K3a	N/A	Sheffield Hallam University	HE 360	N/A	

K4 - BEng (Hons) top-up Integrated Engineering (Mechanical)

No.	Ref no.	Awarding organisation	Credit value	Guided learning hours	UCAS points value
K4a	N/A	Sheffield Hallam University	HE 360	N/A	

Knowledge qualifications available to this pathway (cont.)

K5 - BEng (Hons) Mechanical Engineering

No.	Ref no.	Awarding organisation	Credit value	Guided learning hours	UCAS points value
K5a	H300	University of the West of England (1st year of entry)	HE 360	N/A	

K6 - BEng (Hons) Materials Engineering (Top-up degree)

No.	Ref no.	Awarding organisation	Credit value	Guided learning hours	UCAS points value
K6a	N/A	Teeside University via Bradford College (3rd year of entry)	HE 360	N/A	

K7 - BEng (Hons) Industrial Engineering

No.	Ref no.	Awarding organisation	Credit value	Guided learning hours	UCAS points value
K7a	H700	Glyndwr University (3rd year of entry)	HE 360	N/A	

Combined qualifications available to this pathway

N/A

Relationship between competence and knowledge qualifications

Note that both C1 and C2 are required for this pathway.

K1 - K7 provide underpinning knowledge for C1 and C2

The designated degrees underpin the knowledge elements of the competence qualification in this pathway. The knowledge qualifications deliver essential underpinning knowledge which supports the fundamental scientific and mathematical principles that equip apprentices with the understanding required to operate effectively and efficiently at a high level within this sub-sector.

Employers will select the knowledge qualification relevant to the job role of the Higher Apprentice. Note that maths options must be included as part of the knowledge qualifications as this is a requirement of the job.

Delivery methods for knowledge based qualifications may vary, from a conventional University based environment, to delivery through a combination of conventional and written/web-based/ distance learning materials.

Transferable skills (Wales)

Essential skills (Wales)

	Minimum level	Credit value
Communication	2	6
Application of numbers	2	6
IT	2	6

Progression routes into and from this pathway

Progression routes into this pathway include those who:

- have completed the Higher Apprenticeship in Advanced Manufacturing at Level 4 and
- have undertaken a relevant Foundation Degree Mechanical or related technology linking to the Honours degrees listed in this framework
- have completed a relevant HNC/HND that links to the Honours degrees listed in this framework
- have completed the relevant engineering honours degree but do not have Incorporated Engineer status
- have completed the Level 4 NVQ Extended Diploma in Engineering Manufacture (QCF)

Progression from this pathway for those who have completed a Higher Apprenticeship in Advanced Manufacturing (Level 6) Mechanical:

- employment as an engineer in the job roles stated in this framework or similar job roles
- Masters Degree in the relevant specialism
- monitored Professional Development to achieve Chartered Engineer Registration.

To get more information on careers and job opportunities for Incorporated Engineers in the Mechanical sector we recommend you visit these websites:

www.engc.org.uk/

www.theiet.org/

www.imeche.org

UCAS points for this pathway: N/A

Employee rights and responsibilities

There are two methods of achieving ERR as set out below:

Method 1 - Qualifications

1a. EAL have produced a stand-alone qualification that covers all 9 outcomes of ERR requirements.

Qualification details:
EAL Level 2 Award in Employment Rights and Responsibilities for new Entrants into the Science, Engineering and Manufacturing Sectors (QCF)
QCF qualification ref no: 600/0290/6
Credit value: 5 credits
Training hours: 41

1b. Pearson have produced a stand-alone qualification that can cover all 9 outcomes of ERR requirements if Unit 2 is achieved.

Qualification details:
Pearson BTEC Level 2 Award in WorkSkills for Effective Learning and Employment (QCF)
QCF qualification ref no: 501/1793/2
Credit value: 4 credits
Training hours: 40

Please Note: The Pearson BTEC Level 2 Award consists of a mandatory unit as an introduction to apprenticeships. Apprentices **must then complete Unit 2** which covers the ERR requirements (included within content). This qualification is designed to be assessed in the context of the sector relevant to the apprenticeship framework being undertaken (ie manufacturing/ engineering in this case).

1c. Pearson have produced a Level 3 stand-alone qualification that can cover all 9 outcomes of ERR requirements if Units 2 and 4 are achieved.

Qualification details:
Pearson BTEC Level 3 Award in WorkSkills for Effective Learning and Employment (QCF)
QCF qualification ref no: 501/1791/9
Credit value: 4 credits
Training hours: 40

The Pearson BTEC Level 3 Award consists of a mandatory unit as an introduction to apprenticeships. Apprentices **must then complete Units 2 and 4** which cover the ERR requirements (included within content). This qualification is designed to be assessed in the context of the sector relevant to the apprenticeship framework being undertaken (i.e.

manufacturing/engineering in this case).

Please note: Only Level 2 is required to meet the framework requirements.

1d. City & Guilds have produced a stand-alone qualification that can cover all 9 outcomes of ERR requirements.

Qualification details:
City & Guilds Level 2 Subsidiary Award in Employment and Personal Learning at Work (QCF)
QCF qualification ref no: 600/2819/1
Credit value: 2 credits
Training hours: 15

Please note: Although it may be possible to complete ERR in a minimum of 15 training hours, Semta recommend a minimum of 40 training hours are taken to complete the ERR requirements.

These qualifications will enable apprentices to both know and understand the principles associated with the nine national outcomes such as the world of work and how they are constrained by various legal and organisational procedures for their own well-being. Apprentices achieving the qualifications will have demonstrated that they have the underpinning knowledge relevant for the engineering/manufacturing environment which satisfies the Specification for Apprenticeship Standards for Wales.

Method 2 - Workbook

Semta has produced an Apprentice ERR workbook that is available from: customercare@eal.org.uk

The requirements for completing it must be explained to the apprentice right at the start of their training in order that they may take full advantage of their *company induction where significant amounts of information towards the national outcomes will be covered. The workbook is intended to enable apprentices to know, understand and record the principles associated with the nine national outcomes such as the world of work and how they are constrained by various legal and organisational procedures for their own well-being.

***Please note:** All apprentices must receive a company induction programme.

To claim final certification of the apprenticeship, one of the preceding forms of ERR evidence will be required, together with the ACW Universal Apprentice Certificate Claim form which is available from the Federation for Industry Sector Skills and Standards (Fisss) website: acwcerts.co.uk

Level 6, Pathway 4: Electrical / Electronics

Description of this pathway

Electrical/Electronics:

Total minimum of 497 credits make up from:

Competence: NVQ Level 4 Extended Diploma in Engineering Manufacture (QCF) = 107 credits

Essential Skills Wales 3 x 6 credits =18 credits

Wider Key Skills 2 x 6 credits = 12 credits

Knowledge = 360 credits (FHEQ)

Professional recognition as an Incorporated Engineer

UK Standard for Professional Engineering Competence (Incorporated Engineer)
The competencies specified in the UK Spec are based on occupational standards developed for the main industries and services in which engineers are employed. There are no estimates as to the training hours required to complete the competence standards for IEng as it will vary widely between candidates depending on their previous competence training and experience.

Registration is open to everyone who can demonstrate competence to perform professional work to the necessary standards and commitment to:

- maintain their competence
- work within professional codes
- participate actively within the profession.

Anyone wishing to be registered must apply through one of the professional engineering institutions licensed by the Engineering Council (see www.engc.org.uk/ for a current list). Candidates who believe they measure up to this Standard, or who wish to work towards

registration, should approach one of the listed engineering institutions to obtain further details of how to apply for recognition and registration. The assessment process - known as a professional review - normally takes from one to six months, depending on the extent to which education and training is found to meet the standard requirements, the size of the chosen professional engineering institution and the availability of experienced assessors familiar with the branch of technology in which the applicant works.

The process of assessment starts with a written application made in accordance with the requirements of the particular institution concerned. A detailed description of the format for this will be provided by the institution, but any claim of qualifications, experience or training will need formal documented evidence. In submitting details, applicants will need to show how this relates to the required competences.

What is professional competence?
Professional competence integrates knowledge, understanding, skills and values. It goes beyond the ability to perform specific tasks. The formation process through which engineering professionals become competent generally involves a combination of formal education and further training and experience (generally known as professional development). However these different elements are not necessarily separate or sequential and they may not always be formally structured.

Pages 8 to 27 of the UK Standard For Professional Engineering Competence set out the threshold generic competence standard for registration as an Engineering Technician, Incorporated Engineer or Chartered Engineer, and include some examples of the kind of evidence which would help demonstrate these. The exemplifying educational requirements for each category of registration are also given. The standard has widespread support and is based on occupational standards developed for the main industries and services in which engineers are employed.

Assessment of competence
To become registered, applicants must have their competence assessed through a process known as professional review. The assessment is by practising engineering professionals, trained in this kind of assessment. Applicants are assessed against the competence standards listed in the UK Standard For Professional Engineering Competence document, which may be adapted by the institution to relate specifically to the particular technologies or industries with which it is concerned.

Mentorship
Each apprentice must have an appointed mentor at the start of training to advise them on the evidence they need to accumulate to meet the Incorporated Engineer Standard. In large engineering companies there are Chartered Engineers who can perform this role. Apprentices should receive regular reviews by their mentor at least on a quarterly basis to ensure progress is properly monitored. Those apprentices who work for small and medium sized companies

should contact their Institution to arrange mentorship.

Recording of evidence

Each apprentice must develop a portfolio of evidence he or she has accumulated against the Incorporated Engineer Standard. Most Institutions have an electronic portfolio format that apprentices may use to record progress and evidence against the standard. The types of evidence may be varied but could include the following:

- work-based assignments
- practical tests
- examinations
- work based projects
- dissertations

Apprentices should identify arrangements for evidence recording and mentorship on joining the institution of their choice. The Institute of Mechanical Engineers (IMechE), the Institution of Engineering and Technology (IET) and the Royal Aeronautical Society (RAeS) endorse this framework and will be able to offer advice and guidance. The process is as follows:

1. Professional Engineering Institution approves the Higher Apprenticeship framework at Level 6
2. Apprentice applies for membership and joins an appropriate professional engineering institution
3. Institution allocates a mentor and supplies any related information, plus access to a PD record system where available
4. Apprentice accumulates relevant evidence against the UK-SPEC (IEng) competence requirements through their working experience and the vocational qualification element of their programme. The mentor provides advice on how to keep an appropriate record of this and, in due course, on completing the application for IEng.
5. Apprentice submits IEng application to the Institution, who review the application and may request further details of experience or other supporting evidence
6. At either of these stages, the apprentice may be advised of any shortfall allowing the apprentice to address this
7. Apprentice invited to attend a Professional Review interview.
8. Apprentice is awarded IEng or advised how to address any shortfall.

Other useful forms of reference

The Engineering Council is the UK regulatory body for the engineering profession. EC UK hold the national registers of 235,000 Engineering Technicians (EngTech), Information and Communications Technology Technicians (ICTTech), Incorporated Engineers (IEng) and Chartered Engineers (CEng).

Web-links:

http://www.engc.org.uk/engcdocuments/internet/Website/Student%20guide%20to%20professional%20registration.pdf

www.engc.org.uk/

www.engc.or g.uk/professional-registration/standards/uk-spec

www.theiet.org/

www.imeche.org

http://www.aerosociety.com/

Entry requirements for this pathway in addition to the framework entry requirements

There are no additional requirements other than the general entry conditions

Job title(s)	Job role(s)
Electronics Production Engineer	Liaison between electronics, design and manufacturing facilities, actively co-ordinating and communicating electronics assembly, service, allocation and planning requirements.
Electrical / Electronic Engineer Aerospace Computer Systems	Interpreting custom technical requirements. Design, optimisation, control, manufacture & testing of electrical /electronic components & systems aerospace platforms including cockpit displays instrumentation & Power systems, compliance with quality standards, policy & procedures.
Electrical / Electronic Engineer (Wind Power)	Design, manufacture and testing of electrical /electronic components and systems for wind turbines. Ensuring compliance to relevant quality standards.
Motorsport Electrical / Electronic Engineer	Design, manufacture and testing of electrical and electronic equipment on motorsport vehicles. Fault investigation and diagnosis, rectification and remedial action.
Electronics Development Engineer	Design and develop electrical / electronic systems including digital, small power electronics and microprocessors. Review new product designs during the development cycle & provide feedback about testability & manufacturability. Assist with product costing during the development cycle.
Analogue / Rf Design Engineer	Analogue Design Engineer will have substantial Analogue Design experience with good understanding of RF principles and test methods. Practical in depth experience designing power electronics in the form of SMPS and power pulse circuits.
Acoustic Design Engineer	Acoustic design of high end audio products, working with the Mechanical team to design the acoustic performance of audio products. Reviewing acoustic test results and organising and conducting design reviews and fixing any problems that arise in the acoustics of the design.

Qualifications

Competence qualifications available to this pathway

C1 - UK Standard for Professional Engineering Competence (Incorporated Engineer)

No.	Ref no.	Awarding organisation	Credit value	Guided learning hours	UCAS points value
C1a	N/A	Institute of Mechanical Engineers (IMechE)	N/A	Various	N/A
C1b	N/A	Institute of Engineering and Technology (IET)	N/A	Various	N/A
C1c	N/A	Royal Aeronautical Society (RAeS)	N/A	Various	N/A

C2 - Level 4 NVQ Extended Diploma in Engineering Manufacture (QCF)

No.	Ref no.	Awarding organisation	Credit value	Guided learning hours	UCAS points value
C2a	600/9529/5	City & Guilds	107	461	N/A
C2b	600/9576/3	EAL	107	461	N/A
C2c	601/1863/5	ETC Awards Ltd	107	461	N/A

Knowledge qualifications available to this pathway

K1 - BEng (Hons) Electrical and Electronic Engineering

No.	Ref no.	Awarding organisation	Credit value	Guided learning hours	UCAS points value
K1a	H606	University of West England (3rd year of entry)	HE 360	N/A	

K2 - BEng (Hons) top-up Integrated Engineering (Electrical)

No.	Ref no.	Awarding organisation	Credit value	Guided learning hours	UCAS points value
K2a	N/A	Sheffield Hallam University	HE 360	N/A	

K3 - BEng (Hons) top-up Integrated Engineering (Mechanical)

No.	Ref no.	Awarding organisation	Credit value	Guided learning hours	UCAS points value
K3a	N/A	Sheffield Hallam University	HE 360	N/A	

K4 - BEng (Hons) Industrial Engineering

No.	Ref no.	Awarding organisation	Credit value	Guided learning hours	UCAS points value
K4a	H700	Glyndwr University (3rd year of entry)	HE 360	N/A	

Combined qualifications available to this pathway

N/A

Relationship between competence and knowledge qualifications

Note that both C1 and C2 are required for this pathway.

K1 - K4 provide underpinning knowledge for C1 and C2

The designated degrees underpin the knowledge elements of the competence qualification in this pathway. The knowledge qualifications deliver essential underpinning knowledge which supports the fundamental scientific and mathematical principles that equip apprentices with the understanding required to operate effectively and efficiently at a high level within this sub-sector.

Employers will select the knowledge qualification relevant to the job role of the Higher Apprentice. Note that maths options must be included as part of the knowledge qualifications as this is a requirement of the job.

Delivery methods for knowledge based qualifications may vary, from a conventional University based environment, to delivery through a combination of conventional and written/web-based/ distance learning materials.

Transferable skills (Wales)

Essential skills (Wales)

	Minimum level	Credit value
Communication	2	6
Application of numbers	2	6
IT	2	6

Progression routes into and from this pathway

Progression routes into this pathway include those who:

- have completed the Higher Apprenticeship in Advanced Manufacturing at Level 4 and
- have undertaken a relevant Foundation Degree linking to the Honours degree listed in this framework
- have completed a relevant HNC/HND that links to the Honours degrees listed in this framework
- have completed the relevant engineering honours degree but do not have Incorporated Engineer status
- have completed the Level 4 NVQ Extended Diploma in Engineering Manufacture (QCF).

Progression from this pathway for those who have completed a Higher Apprenticeship in Advanced Manufacturing (Level 6) in Electrical/Electronics:

- employment as an engineer in the job roles stated in this framework or similar roles
- Masters Degree in Electrical / Electronics Engineering
- monitored Professional Development to achieve Chartered Engineer Registration.

To get more information on careers and job opportunities for Incorporated Engineers in the Electrical/ Electronics sector we recommend you visit these websites:

www.engc.org.uk/

www.theiet.org/

www.imeche.org

UCAS points for this pathway: N/A

Employee rights and responsibilities

There are two methods of achieving ERR as set out below:

Method 1 - Qualifications

1a. Excellence, Achievement and Learning Ltd (EAL) have produced a stand-alone qualification that covers all 9 outcomes of ERR requirements.

Qualification details:
EAL Level 2 Award in Employment Rights and Responsibilities for new Entrants into the Science, Engineering and Manufacturing Sectors (QCF)
QCF qualification ref no: 600/0290/6
Credit value: 5 credits
Training hours: 41

1b. Pearson have produced a stand-alone qualification that can cover all 9 outcomes of ERR requirements if Unit 2 is achieved.

Qualification details:
Pearson BTEC Level 2 Award in WorkSkills for Effective Learning and Employment (QCF)
QCF qualification ref no: 501/1793/2
Credit value: 4 credits
Training hours: 40

Please Note: The Pearson BTEC Level 2 Award consists of a mandatory unit as an introduction to apprenticeships. Apprentices **must then complete Unit 2** which covers the ERR requirements (included within content). This qualification is designed to be assessed in the context of the sector relevant to the apprenticeship framework being undertaken (i.e. manufacturing/ engineering in this case).

1c. Pearson have produced a Level 3 stand-alone qualification that can cover all 9 outcomes of ERR requirements if Units 2 and 4 are achieved.

Qualification details:
Pearson BTEC Level 3 Award in WorkSkills for Effective Learning and Employment (QCF)
QCF qualification ref no: 501/1791/9
Credit value: 4 credits
Training hours: 40

The Pearson BTEC Level 3 Award consists of a mandatory unit as an introduction to apprenticeships. Apprentices **must then complete Units 2 and 4** which cover the ERR requirements (included within content). This qualification is designed to be assessed in the context of the sector relevant to the apprenticeship framework being undertaken (i.e.

manufacturing/engineering in this case).

Please note: Only Level 2 is required to meet the framework requirements.

1d. City & Guilds have produced a stand-alone qualification that can cover all 9 outcomes of ERR requirements.

Qualification details:
City & Guilds Level 2 Subsidiary Award in Employment and Personal Learning at Work (QCF)
QCF qualification ref no: 600/2819/1
Credit value: 2 credits
Training hours: 15

Please note: Although it may be possible to complete ERR in a minimum of 15 training hours, Semta recommend a minimum of 40 training hours are taken to complete the ERR requirements.

These qualifications will enable apprentices to both know and understand the principles associated with the nine national outcomes such as the world of work and how they are constrained by various legal and organisational procedures for their own well-being.Apprentices achieving the qualifications will have demonstrated that they have the underpinning knowledge relevant for the engineering/manufacturing environment which satisfies the Specification for Apprenticeship Standards for Wales.

Method 2 - Workbook

Semta has produced an Apprentice ERR workbook that is available from:
customercare@eal.org.uk

The requirements for completing it must be explained to the apprentice right at the start of their training in order that they may take full advantage of their *company induction where significant amounts of information towards the national outcomes will be covered. The workbook is intended to enable apprentices to know, understand and record the principles associated with the nine national outcomes such as the world of work and how they are constrained by various legal and organisational procedures for their own well-being.

***Please note:** All apprentices must receive a company induction programme.

To claim final certification of the apprenticeship, one of the preceding forms of ERR evidence will be required, together with the ACW Universal Apprentice Certificate Claim form which is available from the Federation for Industry Sector Skills and Standards (Fisss) website:
acwcerts.co.uk

Level 6, Pathway 5: Maintenance

Description of this pathway

Maintenance:

Total minimum of 497 credits made up from:

Competence: NVQ Level 4 Extended Diploma in Engineering Manufacture (QCF) = 107 credits

Essential Skills Wales 3 x 6 credits =18 credits

Wider Key Skills 2 x 6 credits = 12 credits

Knowledge = 360 credits (FHEQ)

Professional recognition as an Incorporated Engineer

UK Standard for Professional Engineering Competence (Incorporated Engineer)
The competencies specified in the UK Spec are based on occupational standards developed for the main industries and services in which engineers are employed. There are no estimates as to the training hours required to complete the competence standards for IEng as it will vary widely between candidates depending on their previous competence training and experience.

Registration is open to everyone who can demonstrate competence to perform professional work to the necessary standards and commitment to:

- maintain their competence
- work within professional codes
- participate actively within the profession.

Anyone wishing to be registered must apply through one of the professional engineering institutions licensed by the Engineering Council (see www.engc.org.uk/ for a current list). Candidates who believe they measure up to this Standard, or who wish to work towards

registration, should approach one of the listed engineering institutions to obtain further details of how to apply for recognition and registration. The assessment process - known as a professional review - normally takes from one to six months, depending on the extent to which education and training is found to meet the standard requirements, the size of the chosen professional engineering institution and the availability of experienced assessors familiar with the branch of technology in which the applicant works.

The process of assessment starts with a written application made in accordance with the requirements of the particular institution concerned. A detailed description of the format for this will be provided by the institution, but any claim of qualifications, experience or training will need formal documented evidence. In submitting details, applicants will need to show how this relates to the required competences.

What is professional competence?
Professional competence integrates knowledge, understanding, skills and values. It goes beyond the ability to perform specific tasks. The formation process through which engineering professionals become competent generally involves a combination of formal education and further training and experience (generally known as professional development). However these different elements are not necessarily separate or sequential and they may not always be formally structured.

Pages 8 to 27 of the UK Standard For Professional Engineering Competence set out the threshold generic competence standard for registration as an Engineering Technician, Incorporated Engineer or Chartered Engineer, and include some examples of the kind of evidence which would help demonstrate these. The exemplifying educational requirements for each category of registration are also given. The standard has widespread support and is based on occupational standards developed for the main industries and services in which engineers are employed.

Assessment of competence
To become registered, applicants must have their competence assessed through a process known as professional review. The assessment is by practising engineering professionals, trained in this kind of assessment. Applicants are assessed against the competence standards listed in the UK Standard For Professional Engineering Competence document, which may be adapted by the institution to relate specifically to the particular technologies or industries with which it is concerned.

Mentorship
Each apprentice must have an appointed mentor at the start of training to advise them on the evidence they need to accumulate to meet the Incorporated Engineer Standard. In large engineering companies there are Chartered Engineers who can perform this role. Apprentices should receive regular reviews by their mentor at least on a quarterly basis to ensure progress is properly monitored. Those apprentices who work for small and medium sized companies

should contact their Institution to arrange mentorship.

Recording of evidence

Each apprentice must develop a portfolio of evidence he or she has accumulated against the Incorporated Engineer Standard. Most Institutions have an electronic portfolio format that apprentices may use to record progress and evidence against the standard. The types of evidence may be varied but could include the following:

- work-based assignments
- practical tests
- examinations
- work based projects
- dissertations

Apprentices should identify arrangements for evidence recording and mentorship on joining the institution of their choice. The Institute of Mechanical Engineers (IMechE), the Institution of Engineering and Technology (IET) and the Royal Aeronautical Society (RAeS) endorse this framework and will be able to offer advice and guidance. The process is as follows:

1. Professional Engineering Institution approves the Higher Apprenticeship framework at Level 6
2. Apprentice applies for membership and joins an appropriate professional engineering institution
3. Institution allocates a mentor and supplies any related information, plus access to a PD record system where available
4. Apprentice accumulates relevant evidence against the UK-SPEC (IEng) competence requirements through their working experience and the vocational qualification element of their programme. The mentor provides advice on how to keep an appropriate record of this and, in due course, on completing the application for IEng.
5. Apprentice submits IEng application to the Institution, who review the application and may request further details of experience or other supporting evidence
6. At either of these stages, the apprentice may be advised of any shortfall allowing the apprentice to address this
7. Apprentice invited to attend a Professional Review interview.
8. Apprentice is awarded IEng or advised how to address any shortfall.

Other useful forms of reference

The Engineering Council is the UK regulatory body for the engineering profession. EC UK hold the national registers of 235,000 Engineering Technicians (EngTech), Information and Communications Technology Technicians (ICTTech), Incorporated Engineers (IEng) and Chartered Engineers (CEng).

Web-links

http://www.engc.org.uk/engcdocuments/internet/Website/Student%20guide%20to%20professional%20registration.pdf

www.engc.org.uk/

www.engc.or g.uk/professional-registration/standards/uk-spec

www.theiet.org/

www.imeche.org

http://www.aerosociety.com/

Entry requirements for this pathway in addition to the framework entry requirements

There are no additional requirements other than the general entry conditions

Job title(s)	Job role(s)
Maintenance Engineer	Professional maintenance engineering is the discipline and profession of applying engineering concepts to the optimization of equipment, procedures, and departmental budgets to achieve better maintainability, reliability, and availability of equipment cont...
Maintenance Engineering cont...	Maintenance strategies are central to the smooth operation of complex industrial processes in a wide range of industries including aerospace, electrical and electronics, automotive, nuclear etc cont...
Maintenance Engineering cont...	The planning and implementation of professional maintenance strategies can reduce costly breakdowns which may interrupt production, contribute to sustainable engineering practice to the benefit of the environment, improve safety and drive down costs cont...
Maintenance Engineering cont...	Professional Maintenance Engineers may undertake any or all of the following activities: • Assure optimization of the Maintenance Organization structure •Analysis of repetitive equipment failures •Estimation of maintenance costs and evaluation of alternatives cont...
Maintenance Engineering cont...	•Forecasting of spare parts •Assessing the needs for equipment replacements and establish replacement programs when due • Application of scheduling and project management principles to replacement programs cont...
Maintenance Engineering cont...	•Assessing required maintenance tools and skills for efficient maintenance of equipment •Reviewing personnel transfers to and from maintenance organisations • Assessing and reporting safety hazards associated with maintenance of equipment.

Qualifications

Competence qualifications available to this pathway

C1 - UK Standard for Professional Engineering Competence (Incorporated Engineer)

No.	Ref no.	Awarding organisation	Credit value	Guided learning hours	UCAS points value
C1a	N/A	Institute of Mechanical Engineers (IMechE)	N/A	Various	N/A
C1b	N/A	Institute of Engineering and Technology (IET)	N/A	Various	N/A
C1c	N/A	Royal Aeronautical Society (RAeS)	N/A	Various	N/A

C2 - Level 4 NVQ Extended Diploma in Engineering Manufacture (QCF)

No.	Ref no.	Awarding organisation	Credit value	Guided learning hours	UCAS points value
C2a	600/9529/5	City & Guilds	107	461	N/A
C2b	600/9576/3	EAL	107	461	N/A
C2c	601/1863/5	ETC Awards Ltd	107	461	N/A

Knowledge qualifications available to this pathway

K1 - BEng (Hons) Mechanical Engineering

No.	Ref no.	Awarding organisation	Credit value	Guided learning hours	UCAS points value
K1a	H300	Sheffield Hallam University (3rd year of entry)	HE 360	N/A	

K2 - BEng (Hons) Engineering (Mechanical)

No.	Ref no.	Awarding organisation	Credit value	Guided learning hours	UCAS points value
K2a	H303	Sheffield Hallam University (3rd year of entry)	HE 360	N/A	

K3 - BEng (Hons) Manufacturing Engineering

No.	Ref no.	Awarding organisation	Credit value	Guided learning hours	UCAS points value
K3a	H790	Sheffield Hallam University (3rd year of entry)	HE 360	N/A	

K4 - BEng (Hons) top-up Integrated Engineering (Electrical)

No.	Ref no.	Awarding organisation	Credit value	Guided learning hours	UCAS points value
K4a	N/A	Sheffield Hallam University	HE 360	N/A	

Knowledge qualifications available to this pathway (cont.)

K5 - BEng (Hons) top-up Integrated Engineering (Mechanical)					
No.	**Ref no.**	**Awarding organisation**	**Credit value**	**Guided learning hours**	**UCAS points value**
K5a	N/A	Sheffield Hallam University	HE 360	N/A	

K6 - BEng (Hons) Industrial Engineering					
No.	**Ref no.**	**Awarding organisation**	**Credit value**	**Guided learning hours**	**UCAS points value**
K6a	H700	Glyndwr University (3rd year of entry)	HE 360		

Combined qualifications available to this pathway

N/A

Relationship between competence and knowledge qualifications

Note that both C1 and C2 are required for this pathway.

K1 – K6 provide underpinning knowledge for C1 and C2

The designated degrees underpin the knowledge elements of the competence qualification in this pathway. The knowledge qualifications deliver essential underpinning knowledge which supports the fundamental scientific and mathematical principles that equip apprentices with the understanding required to operate effectively and efficiently at a high level within this sub-sector.

Employers will select the knowledge qualification relevant to the job role of the Higher Apprentice. Note that maths options must be included as part of the knowledge qualifications as this is a requirement of the job.

Delivery methods for knowledge based qualifications may vary, from a conventional University based environment, to delivery through a combination of conventional and written/web-based/ distance learning materials.

Transferable skills (Wales)

Essential skills (Wales)

	Minimum level	Credit value
Communication	2	6
Application of numbers	2	6
IT	2	6

Progression routes into and from this pathway

Progression routes into this pathway include those who:

- have completed the Higher Apprenticeship in Advanced Manufacturing at Level 4 and
- have undertaken a relevant Foundation Degree linking to the Honours degree listed in this framework
- have completed a relevant HNC/HND that links to the Honours degrees listed in this framework
- have completed the relevant engineering honours degree but do not have Incorporated Engineer status
- have completed the Level 4 NVQ Extended Diploma in Engineering Manufacture (QCF)

Progression from this pathway for those who have completed a Higher Apprenticeship in Advanced Manufacturing (Level 6) in Maintenance:

- employment as an engineer in the job roles stated in this framework or similar job roles
- Masters Degree in the relevant specialism
- monitored Professional Development to achieve Chartered Engineer Registration.

To get more information on careers and job opportunities for Incorporated Engineers in the Maintenance sector we recommend you visit these websites:

www.engc.org.uk/

www.theiet.org/

www.imeche.org

UCAS points for this pathway: N/A

Employee rights and responsibilities

There are two methods of achieving ERR as set out below:

Method 1 - Qualifications

1a. EAL have produced a stand-alone qualification that covers all 9 outcomes of ERR requirements.

Qualification details:
EAL Level 2 Award in Employment Rights and Responsibilities for new Entrants into the Science, Engineering and Manufacturing Sectors (QCF)
QCF qualification ref no: 600/0290/6
Credit value: 5 credits
Training hours: 41

1b. Pearson have produced a stand-alone qualification that can cover all 9 outcomes of ERR requirements if Unit 2 is achieved.

Qualification details:
Pearson BTEC Level 2 Award in WorkSkills for Effective Learning and Employment (QCF)
QCF qualification ref no: 501/1793/2
Credit value: 4 credits
Training hours: 40

Please Note: The Pearson BTEC Level 2 Award consists of a mandatory unit as an introduction to apprenticeships. Apprentices **must then complete Unit 2** which covers the ERR requirements (included within content). This qualification is designed to be assessed in the context of the sector relevant to the apprenticeship framework being undertaken (i.e. manufacturing/ engineering in this case).

1c. Pearson have produced a Level 3 stand-alone qualification that can cover all 9 outcomes of ERR requirements if Units 2 and 4 are achieved.

Qualification details:
Pearson BTEC Level 3 Award in WorkSkills for Effective Learning and Employment (QCF)
QCF qualification ref no: 501/1791/9
Credit value: 4 credits
Training hours: 40

The Pearson BTEC Level 3 Award consists of a mandatory unit as an introduction to apprenticeships. Apprentices **must then complete Units 2 and 4** which cover the ERR requirements (included within content). This qualification is designed to be assessed in the context of the sector relevant to the apprenticeship framework being undertaken (i.e.

manufacturing/engineering in this case).

Please note: Only Level 2 is required to meet the framework requirements.

1d. City & Guilds have produced a stand-alone qualification that can cover all 9 outcomes of ERR requirements.

Qualification details:
City & Guilds Level 2 Subsidiary Award in Employment and Personal Learning at Work (QCF)
QCF qualification ref no: 600/2819/1
Credit value: 2 credits
Training hours: 15

Please note: Although it may be possible to complete ERR in a minimum of 15 training hours, Semta recommend a minimum of 40 training hours are taken to complete the ERR requirements.

These qualifications will enable apprentices to both know and understand the principles associated with the nine national outcomes such as the world of work and how they are constrained by various legal and organisational procedures for their own well-being. Apprentices achieving the qualifications will have demonstrated that they have the underpinning knowledge relevant for the engineering/manufacturing environment which satisfies the Specification for Apprenticeship Standards for Wales.

Method 2 - Workbook

Semta has produced an Apprentice ERR workbook that is available from: customercare@eal.org.uk

The requirements for completing it must be explained to the apprentice right at the start of their training in order that they may take full advantage of their *company induction where significant amounts of information towards the national outcomes will be covered. The workbook is intended to enable apprentices to know, understand and record the principles associated with the nine national outcomes such as the world of work and how they are constrained by various legal and organisational procedures for their own well-being.

***Please note:** All apprentices must receive a company induction programme.

To claim final certification of the apprenticeship, one of the preceding forms of ERR evidence will be required, together with the ACW Universal Apprentice Certificate Claim form which is available from the Federation for Industry Sector Skills and Standards (Fisss) website: acwcerts.co.uk

Level 6, Pathway 6: Automotive

Description of this pathway

Automotive:

Total minimum of 497 credits made up from:

Competence: NVQ Level 4 Extended Diploma in Engineering Manufacture (QCF) = 107 credits

Essential Skills Wales 3 x 6 credits =18 credits

Wider Key Skills 2 x 6 credits = 12 credits

Knowledge = 360 credits (FHEQ)

Professional recognition as an Incorporated Engineer

UK Standard for Professional Engineering Competence (Incorporated Engineer)
The competencies specified in the UK Spec are based on occupational standards developed for the main industries and services in which engineers are employed. There are no estimates as to the training hours required to complete the competence standards for IEng as it will vary widely between candidates depending on their previous competence training and experience.

Registration is open to everyone who can demonstrate competence to perform professional work to the necessary standards and commitment to:

- maintain their competence
- work within professional codes
- participate actively within the profession.

Anyone wishing to be registered must apply through one of the professional engineering institutions licensed by the Engineering Council (see www.engc.org.uk/ for a current list). Candidates who believe they measure up to this Standard, or who wish to work towards

registration, should approach one of the listed engineering institutions to obtain further details of how to apply for recognition and registration. The assessment process - known as a professional review - normally takes from one to six months, depending on the extent to which education and training is found to meet the standard requirements, the size of the chosen professional engineering institution and the availability of experienced assessors familiar with the branch of technology in which the applicant works.

The process of assessment starts with a written application made in accordance with the requirements of the particular institution concerned. A detailed description of the format for this will be provided by the institution, but any claim of qualifications, experience or training will need formal documented evidence. In submitting details, applicants will need to show how this relates to the required competences.

What is professional competence?
Professional competence integrates knowledge, understanding, skills and values. It goes beyond the ability to perform specific tasks. The formation process through which engineering professionals become competent generally involves a combination of formal education and further training and experience (generally known as professional development). However these different elements are not necessarily separate or sequential and they may not always be formally structured.

Pages 8 to 27 of the UK Standard For Professional Engineering Competence set out the threshold generic competence standard for registration as an Engineering Technician, Incorporated Engineer or Chartered Engineer, and include some examples of the kind of evidence which would help demonstrate these. The exemplifying educational requirements for each category of registration are also given. The standard has widespread support and is based on occupational standards developed for the main industries and services in which engineers are employed.

Assessment of competence
To become registered, applicants must have their competence assessed through a process known as professional review. The assessment is by practising engineering professionals, trained in this kind of assessment. Applicants are assessed against the competence standards listed in the UK Standard For Professional Engineering Competence document, which may be adapted by the institution to relate specifically to the particular technologies or industries with which it is concerned.

Mentorship
Each apprentice must have an appointed mentor at the start of training to advise them on the evidence they need to accumulate to meet the Incorporated Engineer Standard. In large engineering companies there are Chartered Engineers who can perform this role. Apprentices should receive regular reviews by their mentor at least on a quarterly basis to ensure progress is properly monitored. Those apprentices who work for small and medium sized companies

should contact their Institution to arrange mentorship.

Recording of evidence

Each apprentice must develop a portfolio of evidence he or she has accumulated against the Incorporated Engineer Standard. Most Institutions have an electronic portfolio format that apprentices may use to record progress and evidence against the standard. The types of evidence may be varied but could include the following:

- work-based assignments
- practical tests
- examinations
- work based projects
- dissertations

Apprentices should identify arrangements for evidence recording and mentorship on joining the institution of their choice. The Institute of Mechanical Engineers (IMechE), the Institution of Engineering and Technology (IET) and the Royal Aeronautical Society (RAeS) endorse this framework and will be able to offer advice and guidance. The process is as follows:

1. Professional Engineering Institution approves the Higher Apprenticeship framework at Level 6
2. Apprentice applies for membership and joins an appropriate professional engineering institution
3. Institution allocates a mentor and supplies any related information, plus access to a PD record system where available
4. Apprentice accumulates relevant evidence against the UK-SPEC (IEng) competence requirements through their working experience and the vocational qualification element of their programme. The mentor provides advice on how to keep an appropriate record of this and, in due course, on completing the application for IEng.
5. Apprentice submits IEng application to the Institution, who review the application and may request further details of experience or other supporting evidence
6. At either of these stages, the apprentice may be advised of any shortfall allowing the apprentice to address this
7. Apprentice invited to attend a Professional Review interview.
8. Apprentice is awarded IEng or advised how to address any shortfall.

Other useful forms of reference

The Engineering Council is the UK regulatory body for the engineering profession. EC UK hold the national registers of 235,000 Engineering Technicians (EngTech), Information and Communications Technology Technicians (ICTTech), Incorporated Engineers (IEng) and Chartered Engineers (CEng).

Web-links:
http://www.engc.org.uk/engcdocuments/internet/Website/ Student%20guide%20to%20professional%20registration.pdf

www.engc.org.uk/

www.engc.or g.uk/professional-registration/standards/uk-spec

www.theiet.org/

www.imeche.org

Entry requirements for this pathway in addition to the framework entry requirements

There are no additional requirements other than the general entry conditions

Job title(s)	Job role(s)
Senior Production Technician	Plan the production run, redesign machine tools, equipment and processes to make new parts, monitor costs and production schedules, oversee quality control
Automotive Senior Technician - Design	Use draughting skills and computer-aided design software, to turn ideas into blueprints for development and testing. Weigh up issues such as reliability and safety, whether production would be cost-effective, potential environmental impact and the 'look'
Automotive Senior Technician – Development	Build and test development prototypes, use a combination of computer simulations and physical tests to assess strengths, weaknesses, performance and safety (e.g. test the design aerodynamics in a wind tunnel)
Senior Manufacturing Technician	Perform functions associated with all manufacturing operations, including working with engineers in set-up and calibration tasks, as well as performing rework and quality testing related to the production of parts, components, subassemblies and final assemblies
Motorsport Senior Technician (Mechanical)	Design and configuration of motorsport engines, transmissions, suspension, steering, brakes, fuel systems and other components both at the factory and trackside
Motorsport Senior Technician (Electrical / Electronics)	Setting up electrical and electronic systems on motorsport vehicles, testing performance and analysing results

Qualifications

Competence qualifications available to this pathway

C1 - UK Standard for Professional Engineering Competence (Incorporated Engineer)					
No.	**Ref no.**	**Awarding organisation**	**Credit value**	**Guided learning hours**	**UCAS points value**
C1a	N/A	Institute of Mechanical Engineers (IMechE)	N/A	Various	N/A
C1b	N/A	Institute of Engineering and Technology (IET)	N/A	Various	N/A

C2 - Level 4 NVQ Extended Diploma in Engineering Manufacture (QCF)					
No.	**Ref no.**	**Awarding organisation**	**Credit value**	**Guided learning hours**	**UCAS points value**
C2a	600/9529/5	City & Guilds	107	461	N/A
C2b	600/9576/3	EAL	107	461	N/A
C2c	601/1863/5	ETC Awards Ltd	107	461	N/A

Knowledge qualifications available to this pathway

K1 - BEng (Hons) in Applied Engineering					
No.	**Ref no.**	**Awarding organisation**	**Credit value**	**Guided learning hours**	**UCAS points value**
K1a	N/A	University of Warwick (3rd year of entry)	HE 360	N/A	

Knowledge qualifications available to this pathway (cont.)

K2 - BEng (Hons) Industrial Engineering					
No.	**Ref no.**	**Awarding organisation**	**Credit value**	**Guided learning hours**	**UCAS points value**
K2a	H700	Glyndwr University (3rd year of entry)	HE 360	N/A	

Combined qualifications available to this pathway

N/A

Relationship between competence and knowledge qualifications

Note that both C1 and C2 are required for this pathway.

K1 and K2 provide underpinning knowledge for C1 and C2

The designated degrees underpin the knowledge elements of the competence qualification in this pathway. The knowledge qualifications deliver essential underpinning knowledge which supports the fundamental scientific and mathematical principles that equip apprentices with the understanding required to operate effectively and efficiently at a high level within this sub-sector.

Employers will select the knowledge qualification relevant to the job role of the Higher Apprentice. Note that maths options must be included as part of the knowledge qualifications as this is a requirement of the job.

Delivery methods for knowledge based qualifications may vary, from a conventional University based environment, to delivery through a combination of conventional and written/web-based/ distance learning materials.

Transferable skills (Wales)

Essential skills (Wales)

	Minimum level	Credit value
Communication	2	6
Application of numbers	2	6
IT	2	6

Progression routes into and from this pathway

Progression routes into this pathway include those who:

- have completed the Higher Apprenticeship in Advanced Manufacturing at Level 4 and
- have undertaken a relevant Foundation Degree linking to the Honours degree listed in this framework
- have completed a relevant HNC/HND that links to the Honours degrees listed in this framework
- have completed the relevant engineering honours degree but do not have Incorporated Engineer status
- have completed the Level 4 NVQ Extended Diploma in Engineering Manufacture (QCF)

Progression from this pathway for those who have completed a Higher Apprenticeship in Advanced Manufacturing (Level 6) in Automotive:

- employment as an engineer in the job roles stated in this framework or similar job roles
- Masters Degree in the relevant specialism
- monitored Professional Development to achieve Chartered Engineer Registration.

To get more information on careers and job opportunities for Incorporated Engineers in the Automotive sector we recommend you visit these websites:

www.engc.org.uk/

www.theiet.org/

www.imeche.org

UCAS points for this pathway: N/A

Employee rights and responsibilities

There are two methods of achieving ERR as set out below:

Method 1 - Qualifications

1a. EAL have produced a stand-alone qualification that covers all 9 outcomes of ERR requirements.

Qualification details:
EAL Level 2 Award in Employment Rights and Responsibilities for new Entrants into the Science, Engineering and Manufacturing Sectors (QCF)
QCF qualification ref no: 600/0290/6
Credit value: 5 credits
Training hours: 41

1b. Pearson have produced a stand-alone qualification that can cover all 9 outcomes of ERR requirements if Unit 2 is achieved.

Qualification details:
Pearson BTEC Level 2 Award in WorkSkills for Effective Learning and Employment (QCF)
QCF qualification ref no: 501/1793/2
Credit value: 4 credits
Training hours: 40

Please Note: The Pearson BTEC Level 2 Award consists of a mandatory unit as an introduction to apprenticeships. Apprentices **must then complete Unit 2** which covers the ERR requirements (included within content). This qualification is designed to be assessed in the context of the sector relevant to the apprenticeship framework being undertaken (i.e. manufacturing/ engineering in this case).

1c. Pearson have produced a Level 3 stand-alone qualification that can cover all 9 outcomes of ERR requirements if Units 2 and 4 are achieved.

Qualification details:
Pearson BTEC Level 3 Award in WorkSkills for Effective Learning and Employment (QCF)
QCF qualification ref no: 501/1791/9
Credit value: 4 credits
Training hours: 40

The Pearson BTEC Level 3 Award consists of a mandatory unit as an introduction to apprenticeships. Apprentices **must then complete Units 2 and 4** which cover the ERR requirements (included within content). This qualification is designed to be assessed in the context of the sector relevant to the apprenticeship framework being undertaken (i.e.

manufacturing/engineering in this case).

Please note: Only Level 2 is required to meet the framework requirements.

1d. City & Guilds have produced a stand-alone qualification that can cover all 9 outcomes of ERR requirements.

Qualification details:
City & Guilds Level 2 Subsidiary Award in Employment and Personal Learning at Work (QCF)
QCF qualification ref no: 600/2819/1
Credit value: 2 credits
Training hours: 15

Please note: Although it may be possible to complete ERR in a minimum of 15 training hours, Semta recommend a minimum of 40 training hours are taken to complete the ERR requirements.

These qualifications will enable apprentices to both know and understand the principles associated with the nine national outcomes such as the world of work and how they are constrained by various legal and organisational procedures for their own well-being. Apprentices achieving the qualifications will have demonstrated that they have the underpinning knowledge relevant for the engineering/manufacturing environment which satisfies the Specification for Apprenticeship Standards for Wales.

Method 2 - Workbook

Semta has produced an Apprentice ERR workbook that is available from: customercare@eal.org.uk

The requirements for completing it must be explained to the apprentice right at the start of their training in order that they may take full advantage of their *company induction where significant amounts of information towards the national outcomes will be covered. The workbook is intended to enable apprentices to know, understand and record the principles associated with the nine national outcomes such as the world of work and how they are constrained by various legal and organisational procedures for their own well-being.

***Please note:** All apprentices must receive a company induction programme.

To claim final certification of the apprenticeship, one of the preceding forms of ERR evidence will be required, together with the ACW Universal Apprentice Certificate Claim form which is available from the Federation for Industry Sector Skills and Standards (Fisss) website: acwcerts.co.uk

The remaining sections apply to all levels and pathways within this framework.

How equality and diversity will be met

Cogent, Improve, ProSkills and Semta recognise the business benefits of having apprentices from a wide variety of diverse backgrounds to contribute to the talent pool. In particular the sector faces an aging workforce and the probability of skill shortages, therefore we must look to attract new entrants from a much more diverse recruitment pool.

We are committed to ensuring that equality and diversity drives all aspects of apprentice selection and recruitment and recognise that this is a challenge in a sector which is traditionally white, male-dominated:

• **Nuclear operations**: Whilst nuclear operations are efficient, clean and has a good safety record, there is still a misconception this form of work is dirty and dangerous which acts as a deterrent. Staff turnover in companies that have nuclear operations is low
• **Process and Manufacturing** Industries workforce historically has a poor image and a misconception that jobs in these industries are carried out in dark, dirty and potentially dangerous environments. On the contrary, nowadays Process and Manufacturing Industries are very high tech and largely controlled by sophisticated computer technology
• **Science, engineering and technology** - women make up 50% of the labour market, yet they make up less than 20% of the labour market in science, engineering and technology despite the Women into Science and Engineering projects run in the past and the current Women in work and engineering project.

Despite the encouraging numbers of both female participants and ethnic minorities on the Principal Learning Qualifications in Engineering and Manufacturing and Product Design, the manufacturing and engineering sectors have a significant way to go to encourage women and those from ethnic minority groups into engineering and manufacturing careers.

As partners in this apprenticeship we are taking the following actions to help address these imbalances:

Cogent
• Introduced a series of industry specific case studies and Careers Pathways on the Cogent Careers web site (www.cogent-careers.com) to encourage people from all backgrounds to enter the nuclear industry
• Works very closely with the National Skills Academy for Nuclear to promote various initiatives such as Energy Foresight within schools (www.nuclear.nsacademy.co.uk)
• Regularly supports regional/ national careers fairs/ skills events to promote apprenticeships, providing an ideal opportunity to address issues faced by women and ethnic minorities
• Works with representative groups such as the United Kingdom Resource Centre, engaging

with their Women in Science and Engineering Work programmes.

Improve

• Ongoing monitoring of data to identify any issues and intervene where necessary
• Developing careers materials that are accessible to all
• Identifying a process to make it easier for potential apprentices to gain information, e.g. by Improve's web site.

ProSkills

• The Proskills career website www.prospect4u.co.uk has been developed to help raise the profile and set the skills standards and qualifications for the process and manufacturing sector and ensures that the skills system delivers against the current and future needs of the industries it represents. The process and manufacturing sector, which includes Paper is full of exciting and rewarding career opportunities and this website helps individuals to find all the information they need about getting started in any of these innovative industries
• Proskills regularly attend regional and national careers fairs and skills events to promote Apprenticeships. This provides an ideal opportunity to actively address equality and diversity.

Semta

• Signing up to the Government's United Kingdom Resource Centre (UKRC) leading body for advanced gender equality in science, engineering and technology and the CEO's charter in a bid to step up female recruitment
• Semta's careers and qualifications centre includes an emag and articles encouraging more women into science and engineering http://www.semta.org.uk/careers
• Statement on our website that "Semta Apprenticeships Service encourages and supports equal opportunities in the engineering and manufacturing industry. Applications for apprenticeship positions are encouraged from all sections of the community to ensure the industry's workforce reflects the communities in which companies are based. Applications from people with disabilities are encouraged, however it is recognised that the nature of some employment may limit access for those with certain disabilities"
• Development and co-ordination of the national Women and Work programme
• Attend national careers fairs to promote science and engineering to a wide audience.

Apprenticeships are seen as a vital route to encourage and facilitate, a greater diversity of individuals into the industry, therefore entry conditions to this framework are extremely flexible and mentoring has been included to contribute towards increasing retention and achievement rates.

Semta as the Issuing Authority expects providers and employers to comply with the Equality Act 2010 to ensure that applicants are not discriminated against in terms of entry to and promotion within, the sector using the 9 protected characteristics of:
1. Age

2. Disability
3. Gender
4. Gender reassignment
5. Marriage and civil partnerships
6. Pregnancy and maternity
7. Race
8. Religion and Belief
9. Sexual orientation

Download the guidance on the Equality Act here:
www.equalityhumanrights.com/advice-and-guidance/new-equality-act-guidance/

On and off the job training (Wales)

Summary of on- and off-the-job training

Total on and off the job training for all pathways in this framework:

At Level 6 these apprentices will not be required to repeat training and qualifications already accumulated but will only be required to undertake the further competence and knowledge training as specified in the qualifications section of the relevant pathway.

Option 1

For those apprentices who have already achieved the Level 4 Higher Apprenticeship in Advanced Manufacturing, the required on and off-the-job training to complete this framework are:

- 'Incorporated Engineer' status by meeting the UK Standard for Professional Engineering Competence (UK SPEC) - unspecified hours
- Honours degree relevant to the pathway being undertaken – unspecified hours.

The competence requirement is to achieve 'Incorporated Engineer' status by meeting the UK Standard for Professional Engineering Competence (UK SPEC). Total hours will vary according to each candidates skills, knowledge, aptitudes and abilities.

The knowledge requirement is to achieve an Honours degree relevant to the pathway. Training hours are measured in years and semesters and delivery of honours degrees can vary between three years full time or five years part time. All the degrees specified within the pathways within this framework are part time and the duration of the programme will vary according to entry qualifications of candidates.

Option 2

For those apprentices who HAVE NOT achieved the Level 4 Higher Apprenticeship in Advanced Manufacturing. A minimum of 461 hours for the framework which includes the following:

• 'Incorporated Engineer' Status by meeting the UK Standard for Professional Engineering Competence (UK SPEC) - unspecified hours
• Honours degree relevant to the pathway being undertaken – unspecified hours
• Level 4 NVQ Extended Diploma in Engineering Manufacture (QCF) = 461 hours

Evidence requirements for claiming an Apprenticeship Certificate
FISSS (The Federation of Industry Sector Skills & Standards), who were formerly known as The Alliance of Sector Skills Councils, have recently been appointed as the certificating authority for Welsh Apprenticeships. FISSS have developed a new online system called ACW (Apprenticeship Certification Wales) for Welsh Apprenticeship certification which has replaced the previous paper based system. This means that all Apprenticeship completion certificates must now be claimed via the new ACW online system.

If you are a Training Provider claiming an Apprenticeship completion certificate on behalf of an apprentice then you will need to register on ACW for a user name and password before you are able to register apprentices and claim certification. If you are an apprentice claiming an Apprenticeship completion certificate for yourself then you will need to go to the ACW for an application form.

Off-the-job training

Option 1

For those apprentices who have already achieved the Level 4 Higher Apprenticeship in Advanced Manufacturing the following is required:

- Honours degree for the relevant pathway (unspecified hours)

Option 2

For those apprentices who HAVE NOT achieved the Level 4 Higher Apprenticeship in Advanced Manufacturing, they will be required to undertake the following, which includes a minimum of 494 hours off the job for the framework:

- Honours degree for the relevant pathway (unspecified hours)
- Essential Skills Wales (notional value 60 hours x 3) = 180 hours
- Wider Key Skills (ILP and WWO) 60 hours x 2 = 120 hours
- ERR = 40 minimum hours
- Mentoring 154 weeks x 1 hour week = 154 hours

How this requirement will be met

Off-the-job training needs to:

• achieve clear and specific outcomes which contribute directly to the successful achievement of the framework and this may include accredited and non-accredited elements of the

framework
• be planned, reviewed and evaluated jointly between the apprentice, training officer, assesors, University lecturers, manager and institution mentor
• allow access as and when required by the apprentice to persons mentioned above
• be delivered through one or more of the following methods: individual and group tutoring, e-learning, distance learning, coaching, mentoring, feedback and assessment, collaborative/networked learning with peers or guided study

Requirement to demonstrate knowledge components at Level 6
The knowledge requirements for each pathway are specified in the qualifications tables, plus the sections covering Employee Rights and Responsibilities (ERR), Essential Skills Wales and the Wider Key skills.

Knowledge requirement
In all cases these are accredited Engineering Honours Degrees that meet the benchmark statement that that defines the academic standard expected of graduates with an engineering degree. The defined learning outcomes are those published by the Engineering Council UK (ECUK) in the UK Standard for Professional Engineering Competence (UK-SPEC): The Accreditation of Higher Education Programmes (2004).

These degree courses usually involve three years' full-time study or up to five years' part-time study. Those apprentices who have completed the relevant Foundation degree within the Advanced Manufacturing Higher Apprenticeship at Level 4, will not be required to undertake all five years of part time study specified for the Honours Degree, but may negotiate to enter the appropriate year of the part time degree course. In some cases the apprentice may need to study a bridging/top up course to do so.

Those Advanced Manufacturing Level 4 Higher Apprentices who have undertaken HNC or HND qualifications will need to discuss the entry requirements with the relevant University to establish what mitigation these qualifications might bring against the full course requirements. In most cases the apprentice will need to study a bridging/top up course to do so.

Providers will not be required to record individual on and off the job training hours. However for certification purposes, the provider will be required to declare that the apprentice has completed the on and off the job training hour requirement as set out in this Apprenticeship framework.

Training hours delivered under an apprenticeship agreement may vary depending on the previous experience and attainment of the apprentice.

The amount of off-the-job training required to complete the apprenticeship under the

apprenticeship agreement may then be reduced accordingly, provided the total number of off-the-job hours for this framework can be verified for apprenticeship certification.

Previous attainment
Where a learner enters an apprenticeship agreement having previously attained parts or all of the relevant qualifications, this prior learning needs to be recognised using either QCF credit transfer for achievements within the QCF; or through recording of exemptions for certificated learning outside of the QCF.

For apprentices who have already achieved the relevant qualifications, they must have been certificated within 5 years of applying for the Apprenticeship Certificate.

Previous experience
Where a learner enters an apprenticeship agreement with previous work-related experience, this prior learning needs to be recognised (see QCF Guidance on Claiming Credit for further details). To count towards apprenticeship certification, previous experience must be recorded using the appropriate Awarding Organisation's QCF 'Recognition of Prior Learning' procedures and the hours recorded may then count towards the off-the-job hours required to complete the apprenticeship.

Evidence of achievement of the off-the-job requirements:

• A copy of the certificate (Degree certificate) of achievement of the knowledge qualification in this framework for the relevant pathway
• A copy of the ESW certificate for Communication, Application of Number and ICT
• Evidence of achievement of the Wider Key Skills of ILP and WWO
• A copy of the certificate for one of the ERR qualifications or the sign off sheet from the Semta ERR workbook.

On-the-job training

Minimum on the job training hours

Option 1

For those apprentices who have already achieved the Level 4 Higher Apprenticeship in Advanced Manufacturing the total hours for on the job training are unspecified:

• 'Incorporated Engineer' Status by meeting the UK Standard for Professional Engineering Competence (UK SPEC).

Option 2

For those apprentices who HAVE NOT achieved the Level 4 Higher Apprenticeship in Advanced Manufacturing, a minimum of 461 hours for on the job training hours PLUS the required hours to achieve Incorporated Engineer Status

• Level 4 NVQ Extended Diploma in Engineering Manufacture = 461 hours (to be achieved before commencing the IEng UK spec requirements)
• 'Incorporated Engineer' Status by meeting the UK Standard for Professional Engineering Competence (UK SPEC) – unspecified hours.

How this requirement will be met

The competencies specified in the UK Spec are based on occupational standards developed for the main industries and services in which engineers are employed.

There are no estimates as to the training hours required to complete the competence standards for IEng as it will vary widely between candidates depending on their previous competence training and experience.

No candidate will have accumulated less than 461 hours of on-the-job competence before undertaking the further work required to meet the IEng spec within the Level 6 framework.

How this requirement will be met
The engineering profession in the UK is well respected internationally. Individuals aspiring to be recognised as professional engineers and engineering technicians often need independent assessment of their competence. The UK Standard for Professional Engineering Competence (UK-SPEC) provides the means to achieve this.

Evidence of achievement of the on the job element of this framework for all pathways:

- a copy of the Level 4 NVQ Extended Diploma in Engineering Manufacture (QCF) certificate
- letter for the award of Incorporated Engineer status from IMechE, IET or RAeS.

Wider key skills assessment and recognition (Wales)

Improving own learning and performance

Improving own Learning and Performance is mandatory at Level 2 as these skills are essential to improving performance and productivity.

Working with others

Working with Others is mandatory at Level 2 as these skills are essential to improving performance and productivity.

Problem solving

Although the ability to problem solve is required in many engineering processes, it is dealt with 'on-the-job' within the Competence and Knowledge components rather than in the abstract. Therefore problem solving is not mandatory for this framework, however, apprentices are encouraged to gather evidence of this skill during their apprenticeship, should they they wish to claim this at a later date.

Additional employer requirements

Routes to Incorporated Engineer Registration

Those who use this framework should be, and in many cases are, aware of the significant opportunities that exist to gain accreditation at Incorporated Status within the professional institutions.

The Institution of Engineering and Technology (IET), Institution of Mechanical Engineers (IMechE) and the Royal Aeronautical Society (RAeS) view all components of the framework as necessary to contributing to the apprentices development of the necessary skills, knowledge, competence and commitment.

The IET /IMechE Professional Review is the assessment procedure for registration with the Engineering Council UK. Following the submission of an application form, the Professional Review comprises of an assessment of academic qualifications, the proposer's forms and the evidence summary. For applicants seeking Incorporated Engineer registration the process is then completed by an interview.

The Professional Review interviewers make a holistic assessment of professional competence and provide applicants with an opportunity to expand on the information within their applications. Applicants are given the opportunity to demonstrate their commitment to the profession, to Continuing Professional Development (CPD) and other codes of conduct. Following the interview, a report is sent the Membership Committee for final assessment.

The Membership Committee carries out the final stage of the assessment. Representatives are drawn from a cross section of the engineering industry and consider a large number of applications. They review evidence from statements describing the applicant's current position, professional experience, the qualifying report on professional development, the interview report and reports from supporters.

Higher Apprentices will be encouraged to become Associate Members of IMechE, IET and RAeS when they start their apprenticeship, in order to gain help and support from the Professional Institutions during their journey to registration.

Useful websites:
www.engc.org.uk/

http://www.engc.org.uk/ukspec.aspx
www.theiet.org/
www.imeche.org

apprenticeship
FRAMEWORKS ONLINE

For more information visit
www.afo.sscalliance.org