apprenticeship
FRAMEWORK

Composite Engineering (Craft and Technician) (Wales)

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Apprenticeships

Composite Engineering (Craft and Technician) (Wales)

Contents

Framework summary

Composite Engineering (Craft and Technician)

Apprenticeship in Composite Engineering

Pathways for this framework at level 3 include:

Pathway 1: Composite Engineering

Competence qualifications available to this pathway:

C1 - Level 3 NVQ Extended Diploma in Composite Engineering(QCF)

C2 - Level 3 NVQ Diploma in Composite Engineering (QCF)

Knowledge qualifications available to this pathway:

K1 - EAL Level 3 Diploma in Engineering Technology (QCF)

K2 - City & Guilds Level 3 Diploma in Engineering (QCF)

K3 - EAL Level 3 Diploma in Mechanical Engineering Technology (QCF)

K4 - Pearson BTEC Level 3 Diploma in Manufacturing Engineering (QCF)

K5 - Pearson BTEC Level 3 Diploma in Aeronautical Engineering (QCF)

K6 - Pearson BTEC Level 3 Extended Diploma in Aeronautical Engineering (QCF)

K7 - Pearson BTEC Level 3 Extended Diploma in Manufacturing Engineering (QCF)

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: 2	**This framework includes:**
Framework ID: FR03136	Level 3
Date this framework is to be reviewed by: 31/10/2015	This framework is for use in: **Wales**

Short description

This framework for Composite Engineering at Level 3 has been designed to provide the skills, knowledge and competence requirements to work in the manufacture of composites at an appropriate level within the manufacturing and engineering sectors in Wales.

Contact information

Proposer of this framework

Semta has worked closely with its Composites Sector Skills Group (SSG), the National Composites Centre, Composite Skills Alliance and leading companies such as Airbus, Aircelle, AugustaWestland, Bombardier, Cobham, Composites UK, Hexcel, Rolls Royce and Sunseeker to define National Occupational Standards (NOS). From the NOS, qualifications such as NVQs and Technical Certificates have been developed that are suitable for use within apprenticeship frameworks.

There is widespread realisation that the use of composites within engineered products is becoming prolific as these materials offer the engineering characteristics that designers are looking for such as strength, lightness, and durability. There is a need to provide a whole range of training packages to ensure that companies have the necessary skills to use these materials in a wide variety of contexts such as Aerospace, Formula 1, Marine, Medical, in fact everywhere where strength and lightness are required in combination.

Central to providing appropriate skills training is to ensure that new entrants to these industries receive state of the art competence and knowledge training that meets current and future needs. Composite Apprenticeships at levels 2, 3 & 4 will ensure that 16 to 25 year olds are given the skills necessary to contribute to this rapidly expanding area.

Developer of this framework

Name:	Bonita Searle-Barnes
Organisation:	Semta
Organisation type:	Sector Skills Council
Job title:	Technical Specialist
Phone:	01923 234881
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

Changes to competency qualifications at Level 3 as requested by Awarding Organisations and employers.

Summary of changes made to this framework

Pathway 1: Composite Engineering

- Two new competence qualifications have been added

Qualifications removed

None

Qualifications added

Pathway 1: Composite Engineering

- C1b - ETCAL Level 3 NVQ Extended Diploma in Composite Engineering (QCF) 601/4502/X (new)
- C2b - ETCAL Level 3 NVQ Diploma in Composite Engineering (QCF) 601/4485/3 (new)

Qualifications that have been extended

None

Purpose of this framework

Summary of the purpose of the framework

The composites industry is coping with manufacturing skills shortages in much the same way as other sub-sectors, however the diversity of materials and processes and the specialist nature of the skills involved means that skills are less transferable from other related sectors compounding shortages.

A UKTI (UK Trade & Investment) and BIS market report completed in April 2010 and published in 2011 entitled 'UK Composites Supply Chain Scoping Study – Key Findings' estimates that there are currently around 1,500 companies involved in the UK composites industry, of which almost 85% of all activity is undertaken by the 38 largest companies. Outside this top 38, the UK supply chain is made up of smaller firms supplying into a variety of industry sectors and export. SME companies are often innovative and forward thinking but lack the financial resource to fully develop new ideas – and improved collaboration within the sector is seen as critical to their future success. Such collaboration needs to occur across the supply chain as well as between large and small companies alike.

The global composites industry is becoming increasingly competitive and the global industry for composite materials is estimated to grow by 4-6% in the next five years. The two sectors that will drive this growth are anticipated to be aerospace and wind energy.

Today, carbon fibre and glass fibre based materials constitute the greatest value in UK demand and supply of composite components and structures. New metal matrix and ceramic matrix composite materials are being researched in the UK aerospace industry in particular and, in the longer term, may be future growth areas where the UK can play a lead.

• The size of the UK composites industry is between £1bn and £1.6bn
• UK domestic demand for composite components is £0.9bn, comprising UK production of £1.1billion less exports of £0.4billion (mostly aerospace) plus imports of £0.2billion (mostly wind turbine blades)
• The UK composites industry is a large exporter in key areas of the supply chain. These include carbon fibre composite components and structures
• 85% + of industry activity is captured by the top 38 companies which include many global leaders. Additionally there are over 1,000 companies involved in composites - those with composites revenue less than £5m or the in-house production of integrated manufacturers.

The UK Composites Strategy
The UK Composites Strategy published by BIS (the UK Department for Business, Innovation and Skills) in 2009, established a desire to focus on advanced composites, an area it believes

the UK can build a competitive advantage, increase its market share in existing sectors and ensure the use of composites in new industries.

In order to do this, the UK Composites Strategy established four key requirements to be delivered through a collaborative approach:

- leadership and coordination
- value/supply chain development
- technology development
- skills development.

The National Composites Hub has been formed around these principles and hopes to achieve this by bringing together the three key national delivery partners. Based at the National Composites Centre in Bristol, the three partners will operate using shared industry information to ensure that all sizes and types of companies, as well as other organisations working in composites, are offered strong representation and the most effective support solutions for their businesses.

Historically, the UK had a leading position in composites driven by early adoption of carbon-fibre composites in the defence and aerospace industries. However, several other nations have been targeting the composites sector and supporting development of capacity and new capabilities, particularly the USA, Germany, Spain, Japan and Malaysia.

In composite component manufacture, traditionally a strength of UK industry, the competitive position continues to weaken as European competitors take a lead in manufacturing improvements, and lower labour cost countries invest, often with Government support, e.g. in Malaysia, to develop capability.

In both resins and fibres the global industry is already consolidated and led by Japanese and US companies. Many of these players maintain a UK presence to support their overall presence across Europe, and to participate in the UK composites industry itself.

Notable companies who use and develop composites in the UK

The largest composite companies in the UK are:

- Airbus UK
- Aircelle
- AugustaWestland
- Atkins
- Cobham
- Composites UK
- EPM Technology Group
- GE Aviation

- GKN Aerospace
- Marshall Aerospace
- Scott Bader
- Umeco
- Rolls Royce
- Sunseeker

Composites supply chain

There are a variety of companies in the supply chain specialising in different forms of composites manufacture:

- **Composite Structures**
  Design of structures including composite parts; mix of in-house and outsourced manufacture
- **Composite Components**
  Design and manufacture of composite components; focus on outsourced aerospace demand, also automotive niche markets
- **Semi-finished material**
  Production of pre-preg and woven fibres as input to composite component manufacture
- **Resins & Fibres**
  Production of these fibres and resins for semi-finished products

International competitors are investing to develop their composites industries

Many competitor countries have recognised the strategic importance of composite materials and support their companies to develop capability by providing them with a global comparative advantage. Thus the UK is only likely to remain competitive by grasping commercial opportunities and building on the expertise and capability we already have to become world class.

USA

Aerospace, Defence, Wind and Raw materials. The key sectors in which UK companies face competition from the US are the military and civil aerospace sector, from a strong base of composite structure manufacturers and composite component manufacturers. However, government driven purchasing patterns and in particular restrictions on technology derived from the defence industry limits some of the cross-border competition.

France

Aerospace, Fabrics. The growth in aerospace composites use, and France's share of Airbus programmes, has fostered a similar industry structure to that in the UK, with a number of composite structure and composite component manufacturers such as Composites Aquitaine, Duqueine, and several others having revenue exceeding £20million. France also houses a

number of subsidiaries of internationally leading players, for both raw materials and semi-finished materials which export to the UK.

Germany
Aerospace, Wind, Automotive. In aerospace, the German industry is encroaching on the UK's core competency of wing manufacture, evidenced by parts of the Airbus wing skins made in Germany. With established scale and significant experience, German wind turbine blade manufacturing poses a competitive threat to the establishment of a UK manufacturing base in the sector. Exports from composites companies serving the German automotive industry into the UK is limited.

Spain
Aerospace, Wind. Spain is believed to have a competitive advantage over the UK in the component manufacture segment and poses a significant competitive threat in aerospace in particular. This supposedly by Spain winning the manufacture of composite wing panels for Airbus.

Spain has positioned itself as a manufacturing base specialising in composites, compared to UK manufacturers who are built around particular applications (e.g. wings)

Italy
The Italian boat building sector is recognized as being more progressive than the UK and is beginning to leverage its composites expertise as a source of competitive advantage over the UK.

Aerospace competes with the UK in manufacturing large aerospace structures, and is a threat due to its access to US manufacturers such as Boeing.

Japan
Materials, Automotive, Aerospace. Japan has a competitive advantage over the UK carbon fibre manufacturers, with the leading firms manufacturing their products across the globe, reaching virtually all export markets.

Japan is unlikely to be an imminent threat to the UK aerospace composites industry due to limitations imposed on Japanese partners by Boeing on the export of the technology.

China
Multi sector, Low cost production. In the half term China will be a threat to low end volume component manufacturers in the UK, leveraging the country's lower cost of labour.

As China's industry develops, component manufacturers and composite structure manufacturers are expected to face increasing competition from Chinese companies.

Malaysia
Aerospace, Low cost production. Malaysia is already a direct competitor or outsourcing partner to the larger UK composite component manufacturers. This trend is expected to continue. Malaysian composites expertise combined with low cost manufacturing capability pose an on-going threat to the UK industry.

Turkey
The marine sector in Turkey is becoming very competitive in the cost effective manufacture of yachts, a sector that is the mainstay of the UK marine composites industry and therefore poses a threat to UK demand for composites in this sector.

Canada
Aerospace. Canada does not compete directly with the UK to any significant extent but is an important trading partner (notably Bombardier) for the UK composites industry.

Key Markets by Sectors
UK demand for composites is expected to grow rapidly over the next five years due to increasing demand from aerospace and wind applications, from £1.2billion in 2010 to £2billion in 2015. The growth rates for both glass fibre (9% pa) and Carbon fibre (17%pa) composites are faster than those forecast for the USA and rest of Europe, and match or exceed those of emerging markets. Exploiting this growth is a huge opportunity for the UK composite industry.

The key manufacturing markets for composites are currently:

- **Aerospace** - the UK aerospace composite demand will grow at 9% pa over the next five years to £1.1bn as the A350, Joint Strike Fighter and Bombardier programmes achieve full production
- **Wind turbines** - the sector experiencing the largest growth in demand is composite wind turbine blades, where demand is forecast to grow from around £0.1bn to £0.4bn by 2015 and to continue to grow thereafter to £0.6bn by 2020. Underpinning the demand are the plans to grow offshore wind power generation in the UK, focused on the North Sea, with 4,00 turbines installed by 2020
- **Automotive** - carbon fibre composite demand is forecast to grow at over 10% per annum to equal glass fibre demand by 2020; however both relatively small versus other industry sectors
- **Marine** - comprises approximately one third of composite demand outside the top three sectors. The UK boating industry is focused on the manufacture of small to medium sized pleasure craft. Within the industry, there are three large boat builders of scale, with circa 100 smaller firms producing a limited number of craft.

Aerospace
The UK aerospace industry faces a number of challenges in further exploiting the potential of composites, including:

• **Capacity - automation:** The UK needs to introduce automated manufacturing techniques that will allow the cost effective manufacture of large, composite structures to meet the increased production requirements of future aircraft programmes
• **Capability - material supply:** Supply of carbon fibre is a key component in the UK aerospace supply chain. While supply of carbon fibre is not currently an issue, this may change as demand for the material increases in all sectors. This should be closely monitored such that there are readily available sources of supply to deliver the strategic objectives of the nation
• **Capability - skills:** A strategy needs to be put in place that addresses current skills shortages at shop floor level (practical skills) and at a professional level (e.g. design engineering). However the skills strategy also needs to encompass future skills requirements, taking into account the future technology trends within the UK aerospace composites sector
• **Sustainability - recycling:** While the recycling of composites in the aerospace industry is not yet being driven by legislation, as in the automotive industry, the industry is aware of the need to provide recycling solutions in the long term. This could provide an opportunity for UK industry to develop existing capability ahead of other international competition thereby capitalising on our existing technology lead.

Renewable Energy
The renewable energy sector including fuel cells, storage cylinders for compressed natural gas, wind turbine blades and tidal power structures. The wind energy market, particularly offshore, offers the most immediate growth opportunities and should be one of the areas of focus for a national strategy.

Offshore wind is a rapidly growing sector across Northern Europe and will play an important part in meeting Britain's renewable energy and carbon emission reduction targets as well as improving energy security by 2020 and beyond. It has the potential to employ a further 40,000-70,000 workers by 2020, bringing annual economic benefits and investment to the UK of £6-8 billion. Turbine blades are expensive and can amount to as much as 20-25% of the total cost of manufacture and installation of a wind turbine. It is estimated that the value of the UK wind turbine blade market alone will be worth above £5 billion by 2020.The UK is the largest single market for offshore wind globally.

To produce higher power machines, the offshore wind industry is increasingly looking to design and manufacture turbines with larger blades. However, the increase in size and weight requires the use of stiffer materials to prevent the blade bending and hitting the tower. This means that manufacture of larger blades necessitates changes in both materials and manufacturing technology. Current thinking is that as offshore blade size increases, the industry will move from the use of glass fibre composites to the use of stiffer carbon fibre composites.

However the UK offshore wind industry is experiencing the following issues in adopting more composites in its manufacturing processes:

• **Capacity and capability - cost:** The industry needs to reduce the cost of production of large scale composite structures through use of lower cost material forms and automation. This will require a step change in technology in excess of that required by the aerospace industry
• **Capability - quality**: Further automation is required to increase manufacturing quality. This will improve reliability which will reduce the cost of maintenance, repair and overhaul of large turbine structures that is currently a huge expense
• **Capacity and capability - skills**: A need to train staff to help them make the transition from labour intensive production towards automated production
• **Capacity - materials**: The supply of carbon fibre is a constant issue. As the amount used by the wind industry increases, existing manufacturers are looking to expand their manufacturing capability – Composites Technology estimated that by 2017 the wind energy industry could require 60,000 tonnes of carbon fibre per year, which is currently double the global production
• **Sustainability:** Although it may not be of immediate concern, the volume of blades that will be produced for the offshore sector in the UK means that recycling of composite structures and manufacturing waste is an area that will become of interest to turbine manufacturers.

Automotive
Glass fibre composites are currently used for body panels, bumper beams, grill openings, and injection moulded compounds are used to produce front-end structures, and under bonnet components. To date carbon fibre composites are used in only a few consumer vehicles, mainly used in Formula 1 and other high performance sports cars. However, composites have great potential to be a key contributor to weight and CO2 emission reduction in all types of vehicles, including buses and trucks.

Marine
There is already significant usage of composites in the marine industry. Composites are extensively used in recreational and utility craft (military and civil) and lifeboats. This includes the low end of composites technology, and higher end technology such as that used in the Sunseeker luxury motor yacht and the Mirabella luxury sailing yachts.

It is this higher end technology area of composites that has the potential to help sustain the UK competitive position through helping new products to be produced as quickly as possible, and through allowing the development of increasingly high-tech/high value products that can differentiate themselves in the marketplace.

There is increased competition from new entrants to the market, such as Turkey, where significant investment in technology threatens to overtake the UK. This can be addressed by:

• **Capability and capacity - sector spill-over**: The UK has significant expertise in composites in

other industry sectors, which can be transferred into the marine sector. This will help the sector to be more innovative and experimental with new materials and processes, making greater use of composites to produce cost effective, higher value products
• **Capability - skills**: This needs to be developed to follow the technology requirements of the industry.

Challenges: Semta UK sector figures (UK sectors)

Gender
• 21% of Semta's workforce is female (48% for all sectors)
• 500,000 working age women living in the UK (2008) who were qualified in SET, but only 185,000 (37%) were working in SET occupational sectors

Age
• 9% is aged 16-24 (14% for all sectors)
• 14% is aged 60 (12% for all sectors)

Disability
• 12% of workforce has a disability (14% for all sectors)

Ethnicity
• 5% is from an ethnic minority (8% for all sectors)

Hard to fill vacancies
• Around 7,500 vacancies per year - 1,900 due to technical and practical skills

Skills gaps
• Around a quarter of companies have skills gaps
• Gaps mainly in technical, practical or job specific skills plus problem solving, team working, oral communications and management skills
• Sub sector skills priorities are identical:
  o Leadership and Management
  o Process Improvement (Productivity & Competitiveness)
  o Technical Workforce Development
  o Strategic Workforce Planning

Higher level skills
• The proportion of employees in higher-skilled occupations (managers, professionals and technicians) is 52% for Semta's sectors (43% for all sectors)
• 174,000 technical managers, professionals and technicians need to be upskilled to S/NVQ L4 (or equivalent)
• Only 15% of SMEs in Advanced Manufacturing and Engineering employ graduates

Technical skills
• Need to recruit and train 82,000 engineers, scientists and technologists by 2016
• 363,000 of current technical workforce are qualified below world-class standards

Apprenticeships
• 18% of engineering employers have or offer apprenticeships
• In 2010/11: 48,970 starts in Engineering and Manufacturing technologies apprenticeships (up 30% on previous year)

Drivers of skills change
Semta's sectors in the UK felt that the main drivers of future skills requirements would be new legislative or regulatory requirements (48%), introduction of new technologies or equipment (46% of establishments), development of new products and services (42%), introduction of new working practices (41%) and increased competitive pressure (34%). Large and medium-sized employers were most likely to expect a change in their skills needs from the key drivers identified.

The occupations most likely to be affected by the need to acquire new skills or knowledge were craftspersons, managers, operators and technicians.

Craft/technician occupations

Employment
• 253,000 craftsperson and 37,000 technicians are employed in technical roles in engineering sectors in the U.K.

Key occupations
• The main sub-occupations within the craft category include metal working, production and maintenance fitters, welding trades, electricians and electrical fitters, metal machining setters & setter-operators and electrical and electronic engineers

• The main sub-occupations within the technician category include engineering technicians, draughtspersons, laboratory technicians and electrical and electronics technicians

Demographic Profile
• 98% of operators are full time of which 1% are female, 10% aged 16 to 24yrs, 15% are over 60yrs,14% have a disability and 3% have non-white ethnicity
Source: LFS 2009

Current skills and qualifications
• 64% of craftspersons and 73% of technicians were qualified to NVQ Level 3 or higher

Vacancies

• It is estimated that in 2009 there were 2,700 craftsperson vacancies and 1,000 technician vacancies across the engineering sector .
• 690 craft vacancies were hard-to-fill and 280 technician vacancies were hard-to-fill

Skills needs and gaps

• 13% of engineering establishments had skills gaps for craftspersons and 2% had skills gaps for technicians
• 13% of craftspersons and 16% of technicians within engineering establishments had skills gaps

Future skills demand

• 22,200 craftspersons (3,200 per annum) and 6,800 technicians (970 per annum) are required into the engineering sectors over the period 2010-2016
• 10,300 craftspersons and 4,700 technicians will need qualifications at NVQ Level 3 or higher

The Apprenticeship in Composite Engineering will help address both the current skills requirements and future needs for both craft persons and technicians as stated above. It will also address the skills gaps and shortages identified and ensure a steady flow of new craftsmen and technicians into this important industry.

Aims and objectives of this framework (Wales)

The aim of this framework is to attract young people into an expanding and exciting industry, and will provide apprentices with the skills, underpinning knowledge and transferable skills required to operate at craft or technician level in a composites manufacturing environment carrying out a wide variety of defined manufacturing activities.

Further objectives are to:

- provide a structured training programme to develop and upskill the workforce
- incorporate the latest developments in Composite Engineering National Occupational Standards (NOS) at level 3
- provide greater unit flexibility through the QCF
- provide a composite engineering pathway that meets engineering employers needs
- help improve recruitment and retention rates within the industry by offering appropriate career progression
- improve productivity rates and profitability (increased GVA per person)
- address current skills gaps and shortages
- address future skills demands
- better address equality and diversity within the sector as defined above in the framework summary above

- increase participation rates in the frameworks at Apprenticeship level
- tackle the age profile within the sub-sector (15% craft 16% technician workforce being over the age of 60)
- help reduce the carbon footprint by maximising efficiency and eliminating waste
- increase the level of general literacy and numeracy through transferable skills
- provide a career pathway into high level composite engineering jobs and training
- provide a pathway to foundation degree and undergraduate programmes for those who choose this route
- develop apprentices employability and skills making them more attractive to all employers whichever career they choose.

Entry conditions for this framework

The Level 3 framework offers one pathway. Employers would welcome applicants from a wide and diverse background and wish to attract applicants who have an interest to work in a composite manufacturing or engineering environment.

As a guide, the Apprenticeship in Composite Engineering framework is suitable for applicants who have five GCSEs grade C or above including Maths, English, and a Science. This is not a hard and fast rule but may vary according to the pathway chosen and the suitability of individual candidates.

Employers would be interested in applicants who:

- have achieved a engineering manufacturing or composites Foundation framework at Level 2 or
- have GCSEs in English, Maths and a Science - grade C or above or
- have a Welsh Baccalaureate or
- without formal qualifications can show, possibly through a portfolio, that they have the potential to complete this apprenticeship, through having previously worked in the sector at Level 3 or
- have previous employment or work experience in the sector or
- have completed a Pathways to Apprenticeship programme or
- have completed a 14 to 19 Diploma in Engineering or Manufacturing or
- are keen and motivated to work in a composites development and manufacturing environment or
- are willing to undertake a course of training both on-the-job and off-the job and apply this learning in the workplace or
- have completed a Young Apprenticeship in Engineering or other related area or
- have completed the Essential Skills Wales (ESW) or Wider Key Skills qualifications.

Selection process

The selection process on behalf of employers may include initial assessment activity such tests in basic numeracy, literacy, communication skills and spatial awareness. There may also be an interview to ensure potential apprentices have selected the right occupational sector to meet their needs and expectations and those of their employer, as undertaking an apprenticeship is a major commitment for both the individual and the employer.

Applicants who have completed the Welsh Baccalaureate may have completed units or short courses which will provide underpinning knowledge towards the Apprenticeship, this will be assessed during an initial assessment allowing Recognition of Prior Learning (RPL) where appropriate.

Rules to avoid the need to repeat qualifications

To avoid the need to repeat qualifications, processes exist to ensure applicants with prior knowledge, qualifications and/or experience are not disadvantaged. Colleges, Training Providers and Awarding Organisations will be able to advise applicants on the current rules for accrediting prior learning and experience.

It is understood that where applicants have accredited prior learning that apprentices must be offered training which helps them to develop new skills and learning at a higher level.

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 cannot be completed as part of this framework. 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 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 applicants already have one of the knowledge qualifications or individual QCF units at Level 3 (see knowledge qualifications page) 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. For example, they may have already achieved the knowledge element as part of the Welsh Baccalaureate. Furthermore the hours that were spent gaining the qualification may be counted towards the total hours for the apprenticeship.

The Welsh Baccalaureate with its Core programme of personal learning and development studies along with options such as NVQs, Vocational Qualifications and Principal Learning (Engineering World, Discovering Engineering Technology and Engineering the Future) could provide significant opportunities for accreditation of Prior Learning against the components of this framework. The same processes can be applied to GCSEs. Training providers/colleges should be able to advise entrants on the potential reduction in programme duration that could result from accrediting previous qualifications and experience.

Competence qualifications

If applicants already have one of the competence qualifications at Level 3 (see competence qualifications page) 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.

It is important however that there is agreement between the employer and the apprentice that the applicant is currently competent.

As is the case with the knowledge element above the hours that were spent gaining the competence qualification may be counted towards the total hours for the apprenticeship.

Wider Key Skills

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

Prior experience in the sector

Applicants that are already working in the sector or have recently worked, should be able to have their experience formally recognised by an Awarding Organisation and this could count towards the qualification(s) in this framework.

Level 3

Title for this framework at level 3

Apprenticeship in Composite Engineering

Pathways for this framework at level 3

Pathway 1:	Composite Engineering

Level 3, Pathway 1: Composite Engineering

Description of this pathway

Pathway duration approximately 42 months depending on the qualification and unit options selected

Total minimum credit value (made up of the total on- and off-the-job training for all the components) = 186 credits

(For adult apprentices 25 years and over only completing Level 3 NVQ Diploma in Composite Engineering (QCF) - total minimum pathway credit value = 159 credits)

Level 3 NVQ Extended Diploma

Pathway with minimum total learning hours = 1339 training hours
- Competence = minimum 390 hours/ minimum 102 credits
- Knowledge = minimum 480 hours (smallest technical certificate) / minimum 54 credits
- Essential Skills Wales (notional value 60 hours x 3) = 180 hours /18 credits
- Wider Key Skills = 120 hours / 2 x 6 = 12 credits
- Mentoring 154 weeks x 1 hour/week = 154 hours
- ERR = 15 minimum hours

Year 1 = 383 Hours Year 2 = 383 Hours Year 3 = 383 Hours Year 4 = 190 Hours

Minimum off-the-job training hours = 949 training hours
Knowledge - City & Guilds Level 3 Diploma in Engineering (QCF) (480 training hours) plus 469 additional training hours for Essential Skills Wales, Wider Key Skills, ERR and Mentoring

Minimum on-the-job training hours = 390 training hours and is evidenced by completion of the Level 3 NVQ Extended Diploma in Composite Engineering (QCF)

Minimum credit value = 186 credits

Level 3 NVQ Diploma - Only for adults 25 years and over

Pathway with minimum total learning hours = 1216 training hours

- Competence = minimum 267 hours/ minimum 75 credits
- Knowledge = minimum 480 hours (smallest technical certificate) / minimum 54 credits
- Essential Skills Wales (notional value 60 hours x 3) = 180 hours /18 credits
- Wider Key Skills = 120 hours / 2 x 6 = 12 credits
- Mentoring 154 weeks x 1 hour/week = 154 hours
- ERR = 15 minimum hours

Year 1 = 347 Hours Year 2 = 347 Hours Year 3 = 347 Hours Year 4 = 175 Hours

Minimum off-the-job training hours = 949 training hours
Knowledge - City & Guilds Level 3 Diploma in Engineering (QCF) (480 training hours) plus 469 additional training hours for Essential Skills Wales, Wider Key Skills, ERR and Mentoring

Minimum on-the-job training hours = 267 training hours and is evidenced by completion of the Level 3 NVQ Diploma in Composite Engineering (QCF)

Minimum credit value = 159 credits

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)
GRP Finisher/Laminator (large structures)	Open wet lay up lamination, large deck structures (decks, hulls, superstructures 40 to 155ft)
GRP Finisher/Laminator (small structures)	Open wet lay up of small structures (wet bars, showers, seating areas)
Carbon Fibre Pre Preg Technicians	Mould preparation and application of vacuum infusion techniques
Composite Technician	Perform a variety of non-routine and non-repetitive procedures mixing resins and laying up composite material onto tooling moulds using various hand tools. Working with a variety of epoxy agents, fibreglass, Kevlar fabrics, structural adhesives, rivets, threaded and blind fasteners.
Manufacturing Process Engineer	Define, develop and introduce manufacturing processes that deliver safe, high quality, repeatable, cost effective solutions with short lead time outputs. To support the manufacturing function with problem solving and corrective action.
Composite Assembly/Repair Technician	Composite repairs to fibreglass, kevlar & carbon fibre components utilized in the aerospace industry.
Composite Assembly Technician	Manufacture aircraft components from composite core materials including operation of CNC Automatic Tape Layup, Fibre Placement and Double Diaphragm machines.
Tooling Engineer	Design and maintain composite tooling for manufacture, through internal & external resources.
Composite Pattern Maker	Preparing material for CNC machining, modifying patterns to suit drawing issue changes. Liaising with CAM engineers on pattern construction. Shuttering patterns to suit moulding requirements. Hand finishing patterns following machining and painting.
Composite Assemblies Fitter	Use composite hand lay up techniques using prepreg (Carbon Fibre, Glass Fibre). Assembly of metallic to composite structures including sub-assemblies using mechanical fasteners.

Qualifications

Competence qualifications available to this pathway

C1 - Level 3 NVQ Extended Diploma in Composite Engineering(QCF)					
No.	**Ref no.**	**Awarding organisation**	**Credit value**	**Guided learning hours**	**UCAS points value**
C1a	600/8284/7	EAL	102	390	N/A
C1b	601/4502/X	ETC Awards Ltd	102	390	N/A

C2 - Level 3 NVQ Diploma in Composite Engineering (QCF)					
No.	**Ref no.**	**Awarding organisation**	**Credit value**	**Guided learning hours**	**UCAS points value**
C2a	600/8086/3	EAL	75	267	N/A
C2b	601/4485/3	ETC Awards Ltd	75	267	N/A

Knowledge qualifications available to this pathway

K1 - EAL Level 3 Diploma in Engineering Technology (QCF)					
No.	**Ref no.**	**Awarding organisation**	**Credit value**	**Guided learning hours**	**UCAS points value**
K1a	501/1130/9	EAL	78	600	N/A

Knowledge qualifications available to this pathway (cont.)

K2 - City & Guilds Level 3 Diploma in Engineering (QCF)					
No.	**Ref no.**	**Awarding organisation**	**Credit value**	**Guided learning hours**	**UCAS points value**
K2a	600/0882/9	City & Guilds	54	480	N/A

K3 - EAL Level 3 Diploma in Mechanical Engineering Technology (QCF)					
No.	**Ref no.**	**Awarding organisation**	**Credit value**	**Guided learning hours**	**UCAS points value**
K3a	501/1155/3	EAL	78	600	N/A

K4 - Pearson BTEC Level 3 Diploma in Manufacturing Engineering (QCF)					
No.	**Ref no.**	**Awarding organisation**	**Credit value**	**Guided learning hours**	**UCAS points value**
K4a	500/7319/9	Pearson	120	720	N/A

K5 - Pearson BTEC Level 3 Diploma in Aeronautical Engineering (QCF)					
No.	**Ref no.**	**Awarding organisation**	**Credit value**	**Guided learning hours**	**UCAS points value**
K5a	500/7799/5	Pearson	120	720	N/A

Knowledge qualifications available to this pathway (cont.)

K6 - Pearson BTEC Level 3 Extended Diploma in Aeronautical Engineering (QCF)					
No.	**Ref no.**	**Awarding organisation**	**Credit value**	**Guided learning hours**	**UCAS points value**
K6a	500/7800/8	Pearson	180	1080	N/A

K7 - Pearson BTEC Level 3 Extended Diploma in Manufacturing Engineering (QCF)					
No.	**Ref no.**	**Awarding organisation**	**Credit value**	**Guided learning hours**	**UCAS points value**
K7a	500/7314/X	Pearson	180	1080	N/A

Combined qualifications available to this pathway

N/A

Relationship between competence and knowledge qualifications

*Level 3 NVQ Diploma in Composite Engineering (QCF) - is for use by 25 years+ only (see below)

K1 - K7 provide underpinning knowledge for C1a - C1b and C2a - C2b

The designated technical certificates 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 to equip apprentices with the understanding required to operate effectively and efficiently at craft and technician level within this sub-sector.

Employers have agreed that their apprentices should have access to a number of different technical knowledge qualifications that specify varying degrees of theoretical concepts required in the composites sector, including a broad range of mathematical, scientific and engineering/manufacturing principles and processes.

***Note:** The Level 3 NVQ Diploma in Composite Engineering (QCF) may be used by adult apprentices 25 years old and over only, who must:
a) have received appropriate health and safety training relevant to the work area/ environment that they will be working and
b) have worked in an engineering or manufacturing environment and have skills knowledge and understanding broadly comparable to relevant practical NVQ Level 2 units detailed in Performing Engineering Operations, Performing Manufacturing Operations or other skill specific NVQ Level 2 in engineering or manufacturing.

The above must be evidenced by a signed letter from the Apprentices Company and sent prior to the commencement of training to:
Standards and Frameworks Manager, Semta, Unit 2 The Orient Centre, Watford WD24 7GP or frameworks@semta.org.uk

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 the pathway
Entrants to this pathway could be school leavers who have completed their GCSE or Welsh Baccalaureate studies and have some relevant vocational qualification or experience from working in a composite
engineering or manufacturing context and are now seeking to become qualified by undertaking an apprenticeship programme.

More specifically they may:

- have GCSEs in English, Maths and Science - grade C or above or
- have a Welsh Baccalaureate or
- have A or AS levels in Science, Technology, Engineering or Mathematics subjects or
- have completed an engineering manufacturing or composites framework at Level 2 or
- have completed a Pathways to Apprenticeship programme or
- have previous work experience or employment in the engineering or manufacturing sector or
- have completed a 14 to 19 Diploma in Engineering or Manufacturing or
- have completed a Young Apprenticeship in Engineering or other related area or
- be keen and motivated to work in a composites development and manufacturing environment or
- be willing to undertake a course of training both on-the-job and off-the-job and apply this learning in the workplace.

Progression from this pathway for those who complete the Level 3 apprenticeship programme
While significant numbers of Apprentices will seek internal progression to team leader or supervisory roles within their companies, some will want to progress to a Higher

Apprenticeship in Engineering at Level 4; others may decide to opt for a Foundation degree or HNC/HND.

More generally, most ex-apprentices aspire to a combination of internal promotion while at the same time undertaking company sponsored qualifications as specified above.

To further assist apprentices plan their careers we recommend they visit the following websites:

http://www.apprenticeships.org.uk/types-of-apprenticeships/engineering-and-manufacturing-technologies.aspx

https://nationalcareersservice.direct.gov.uk/advice/planning/jobfamily/Pages/manufactureandengineering.aspx

UCAS points for this pathway:

(no information)

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 (ie

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 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

Semta recognises the training and business benefits of having apprentices from a wide variety of diverse backgrounds. We are committed to ensuring equality and diversity drives all aspects of apprentice selection and recruitment. Equal opportunity and diversity refers to the active elimination of unlawful or unfair discrimination against any person or group on the grounds of gender, race, colour, nationality, ethnic origin, religion, age, sexual orientation, marriage and civil partnership, pregnancy and maternity, political belief, disability and where appropriate, prison/offender background where this is deemed irrelevant.

Despite the encouraging numbers of both female participants and ethnic minorities on the 14 to 19 Engineering and Manufacturing Diplomas and Young Apprenticeship programmes, the Engineering sector still has a significant way to go to encourage women into engineering and manufacturing careers.

Semta wishes to make a Gender Equality Commitment. Semta has signed the United Kingdom Resource Centre (UKRC) CEO's charter in a bid to step up female recruitment in its key sectors and programmes. Due to impending skills gaps it is estimated that 187,000 people will be required to be recruited and trained between 2010-2016 within Semta's sectors of aerospace, automotive, bioscience, composites, electrical, electronics, maintenance, marine, mathematics, metals and engineered metal products, renewables and science.

The UKRC is the Government's leading body for advanced gender equality in science, engineering and technology (SET) and the CEO's charter is a formal commitment to the UKRC's agenda to challenge the under-representation of women in SET. Women make up 50% of the labour market, yet they make up less than 20% of the labour market in science, engineering and technology.

The UKRC believes that only a concerted effort by the SET industry will break down the gender barriers that exist in traditionally male-dominated environments and we want to be part of a new consensus which will create an inclusive working environment for women. The manufacturing industries in which this framework operates are traditionally dominated by a white, male workforce. However, faced with an aging workforce and the probability of skill shortages we must look to attract new entrants from a much more diverse recruitment pool. This means that all young people and adults considering engineering and manufacturing as a career are welcome.

Providers of apprenticeship training including employers must be able to demonstrate there are no overt or covert discriminatory practices in the selection and employment of apprentices this

can be demonstrated by the implementing of a Single Equality Scheme (SES). The new Equality Duty (part of the Single Equality Bill) introduced to the public sector requires all public sector bodies to produce a SES combining their current race, disability and gender schemes and should be recognised by all providers of apprenticeship training. The implementation of a SES demonstrates the organisation's commitment to equality and diversity by identifying new and improved ways of working to ensure the organisation is more efficient and effective in meeting the diverse needs of both staff and customers. All those who recruit apprentices, be they colleges, training providers or employers, must comply with the Equality act of 2010 and apply the Equality and Diversity legislation taking full account of the following:

- The Sex Discrimination Act 1975 and Code of Practice
- The Race Relations Act 1976 and Code of Practice
- The Disability Discrimination Act 1995 and Code of Practice
- Employment Equality (Religion or Belief) Regulations 2003
- Employment Equality (Sexual Orientation) Regulations 2003
- Employment Equality (Age) Regulations 2006
- The Equality Act 2010

Providers of apprenticeship training and employers must also actively monitor equality of opportunity and diversity procedures and take positive action where necessary to ensure equal access and treatment for all. Apprenticeships must be seen as a vital route to encourage and facilitate long term change in the equality and diversity of the engineering industry, therefore entry conditions into this framework are extremely flexible. All effort should be made to increase the diversity of our apprentice population.

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

For the Apprenticeship, the hours outlined in the pathway may vary depending on previous experience and attainment of the apprentice. Where a learner enters an apprenticeship agreement having previously attained or acquired some or all of the appropriate competence or knowledge, this prior learning needs to be recognised and documented using the relevant QCF credit transfer, QCF exemption or Recognition of Prior Learning (RPL) procedures.

The amount of 'on-the-job' training required to complete the apprenticeship under the apprenticeship agreement may then be reduced accordingly, provided the total numbers of 'on-the-job' hours for this framework can be verified for apprenticeship certification. Those apprentices who commence training under a new apprenticeship agreement with a new employer may bring a range of prior experience with them. When an apprentice can claim 5% or more hours towards the 'on-the-job' framework total through prior learning acquired from previous full-time education, employment or other vocational programme, then the apprentice's learning programme should include 'customisation'.

Training providers and colleges are encouraged to identify additional 'on-the-job' training programmes that customise the learning to the new workplace. Customisation programmes may include selecting appropriate additional Unit(s) from QCF qualifications, or relevant units recognised as Quality Assured Lifelong Learning (QALL) through a CQFW recognised body, or follow Essential Skills at a level higher than that specified in the framework, including one or more Wider Key Skills or other competency-based qualifications/units relevant to the workplace.

Note
This Composite Engineering framework primarily addresses the training needs of apprentices involved in a composites manufacturing environment . Having discussed the requirement for Essential Skills Wales, it was felt that all three qualifications would be required. For an apprentice who has already achieved the relevant qualification, they must have been certificated within 5 years from the date of application for the Apprenticeship Certificate.

Any off-the-job training undertaken before the apprentice started may count towards the off-the-job training required for the apprenticeship if it was undertaken in relation to an accredited qualification contained in the framework for which an apprenticeship certificate is applied for. Both on and off-the-job training hours need to be planned, reviewed and jointly

evaluated between the apprentice, training instructor, tutor or lecturer and workplace supervisor and where relevant the apprentice's mentor. The apprentice should have access to training support at all times whether on or off-the job training.

On and off-the job training hours should be delivered through a variety of learning methods, individual and group teaching; team-working; e-learning; distance learning; coaching; mentoring; feedback and assessment.

The minimum and maximum training hours and credit value for each pathway are summarised in the pathway descriptions.

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 will superseded the paper based system from 2nd September 2013 onwards. This means that all Apprenticeship completion certificates must be claimed via the new ACW online system from this date onwards.

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

Off-the-job training is defined as time for learning activities away from normal work duties or away from the immediate pressures of the workplace.

The amount of off-the-job training hours required to complete this Foundation Apprenticeship or Apprenticeship framework varies according to each pathway and level of technical certificate selected - however all include a minimum number of training hours for Essential Skills Wales (Communication and Application of Number), Essential Skills Wales, Wider Key Skills (WWO& IOLP), ERR and mentoring.

Refer to each pathway description for a summary of the minimum off-the-job training 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 and a tutor, teacher, mentor or manager
- allow the apprentice access as, and when required to tutors, teachers, mentor(s) or manager
- be delivered through one or more of the following methods: individual and group teaching, e-learning, distance learning, coaching; mentoring, feedback and assessment; collaborative/networked learning with peers, guided study and induction.

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 hours 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.

It is recommended that a mentor is appointed for each apprentice to review their progress on a regular basis. It is estimated that a mentor will have up to two hours per week contact time with each apprentice. This activity will take place off-the-job but is inclusive within the off-the-job hours quoted in the previous section.

Apprentices aged 16 to 24 years must complete the Level 3 NVQ Extended Diploma which includes a number of Performing Engineering Operations (PEO) Level 2 NVQ units. These units should be delivered and assessed in a sheltered and realistic environment and must be achieved before apprentices complete the Level 3 units in the Extended Diploma on the job in the workplace.

It is recognised that in some instances in the past, the PEO NVQ Level 2 has been delivered on a part-time day-release basis in a sheltered environment with the employer delivering the NVQ Level 3 in parallel for the balance of time each week. There are clear disadvantages to this approach:

- the potential for trainees to work in hazardous environments commensurate with Level 3 activities without having received the Health and Safety tuition at Level 2 that would support this situation
- the potential for the learner not to be trained in a progressive way developing competences and knowledge at Level 2 that progresses seamlessly to Level 3.

If providers and employers wish to continue delivery on this basis, they must ensure that:

- all appropriate Health and Safety units are successfully completed at Level 2 prior to any delivery at Level 3 in the workplace
- any units at Level 3 delivered in the workplace must have been preceded by delivery at Level 2 in a sheltered environment.

Previous attainment
Where an apprentice 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 example Principal Learning qualifications.

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

Previous experience
Where an apprentice 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.

For apprentices with prior uncertificated learning experience, they must have been continuously employed in the relevant job role in the industry for five years duration.

The Technical Certificate may be delivered either by day or block release or a combination of the two at a local Training Provider or College of FE or delivered on the employers premises (away from the immediate pressures of the workplace). There may also be a need for self study according to the Training Providers, Colleges or Awarding Organisations arrangements.

Essential Skills Wales delivery methods may vary, however all methods should start with initial/early assessment of a trainees skills, personalised learning should be based on assessing performance to date in order to inform and shape the next step in learning for that individual or group of individuals. Essential Skills Wales are externally assessed and candidates need to be prepared in order to take the tests, again methods of preparation vary but the preferred

method seems to be an intensive off-the-job coaching period where candidates are taught the techniques required to undertake previous test papers to become proficient.

Employee Rights and Responsibilities (ERR) will be delivered as per the guidance in the ERR section of this framework. It is important that all new apprentices receive a comprehensive induction programme on joining their company and that they are aware of the evidence opportunities this presents to complete significant areas of the ERR requirements.

All three key elements (along with Wider Key Skills Wales) will be delivered by a combination of group-based delivery and self-study. In addition there will be a company induction, and it is recommended that a mentor should be appointed for each apprentice to review their progress on a regular weekly basis. All of these activities will take place off-the-job.

The Technical Certificate, Essential Skills Wales and Employee Rights and Responsibilities will be formally delivered by the training provider/college staff in accordance with the awarding organisation's delivery and assessment guidance.

Inclusion of Technical Certificates in the Apprenticeship Framework pathway
Working closely with a number of stakeholders including employers and awarding organisations, we have ensured that employers and apprentices have access to a range of technical certificates across a number of awarding organisations.

Whilst Awarding Organisation partners have ensured that each of the technical knowledge qualification in the pathway delivers, via a core and options approach, the minimum knowledge and understanding requirements for all the (job roles) selected in the appropriate NVQ. Employers have also demanded that they and apprentices have access to a number of different technical knowledge qualifications that specify varying degrees of theoretical concepts required in Composite Manufacturing, Engineering and Advanced Technology Sectors including maths, scientific and engineering/manufacturing principles.

The different sizes (credit value and GLH) of the technical knowledge qualifications reflects the varying degree in the complexity, breadth and depth of the skills, knowledge, understanding and theoretical concepts required in the Composite Manufacturing, Engineering and Advanced Technology Sectors.

The benefits of this approach for both the employer and apprentices is that they can select the most appropriate qualification that meets the business requirements but also recognises the potential progression opportunities both in company including access to further and higher education and the career aspirations and abilities of the apprentice.

The providers of the technical knowledge qualification in partnership with the apprentice and employer could take the following into account and/or undertake further diagnostic assessments to ensure that the apprentice is enrolled on the most appropriate technical

qualification:

- the career aspirations of the apprentice
- the skill and knowledge requirements of the employer for the selected composite occupational area (job role). The employer may have recruited the apprentice based on a workforce planning tool including succession planning
- an assessment of the academic qualifications achieved by the apprentice prior to undertaking the Apprenticeship to determine if the apprentice will have the ability to achieve one of the more academically demanding technical knowledge qualifications
- the results of any psychometric tests that would ascertain whether the apprentice will be able to achieve one of the more academically demanding technical knowledge qualifications
- the preferred learning style of the apprentice including the various assessment methodologies used by the different Awarding Organisations
- custom and practice within the Sector, including any legislation requirements
- local and/or National Trade Union agreements

Evidence of off-the-job training
The range of evidence requirements are as follows:

- Copy of Awarding Organisation certificates for Communication & Application of Number (Essential Skills Wales) or Key skills at the same level as Essential Skills Wales
- Copy of Awarding Organisation certificates for the IOLP and WWO (Wider Key Skills Wales)
- Copy of the Awarding Organisation certificate for the ERR qualification or completed countersigned ERR workbook
- Copy of the Awarding Organisation certificate for the knowledge qualification

On-the-job training

Refer to each pathway description for a summary of the minimum on-the-job training hours.

How this requirement will be met

The units must be assessed in a work environment and must be assessed in accordance with the 'Common Requirements for National Vocational Qualifications (NVQ) in the QCF' which can be downloaded from Semta's website.

Additional assessment requirements have been published by Semta. These additional assessment requirements are set down in Semta's Engineering NVQ QCF unit assessment strategy which can also be downloaded from Semta's website.

On-the-job training hours should:

- 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 and a tutor, teacher, mentor or manager
- allow access as and when required by the apprentice either to a tutor, teacher, mentor or manager
- be delivered during contracted working hours.

Examples of on-the-job training hours in a composite engineering or manufacturing context might be:

- technical or business awareness
- employability skills
- team working and communications
- task-specific workplace instructions or team briefings
- taught sessions by the workplace line manager/instructor
- induction where activities are covered within normal work duties
- coaching of apprentices.

These hours may vary depending on previous experience and attainment of the apprentice. Where a learner enters an apprenticeship agreement having previously attained or acquired the appropriate competencies or knowledge, this prior learning needs to be recognised and documented using the relevant QCF credit transfer, QCF exemption or RPL procedures (as off-the-job above).

The amount of on-the-job training required to complete the apprenticeship under the apprenticeship agreement may then be reduced accordingly, provided the total number of on-the-job hours for this framework can be verified for apprenticeship certification.

All apprentices are required to generate evidence in the workplace to demonstrate completion of the competence qualification, this may be through:

- apprentices generating a portfolio to record evidence of unit completion in accordance with the Awarding Organisations requirements and this will be regularly reviewed by the assessor and mentor. A period of one hour per week has been set aside for mentors to review the ongoing progress of their apprentice

or

- apprentices generating portfolio evidence based on jobs undertaken will need to get this signed as having been completed by a responsible work colleague. This is then examined and agreed by the assessor as a contribution to demonstrating competence in the

workplace.

Generation of portfolio evidence may be paper based, electronic with other mediums such as video evidence. Evidence may be gathered throughout the whole apprenticeship period.

Apprentices must complete the Level 3 NVQ Extended Diploma in Composite Engineering. However if the relevant QCF PEO units have already been achieved and certificated in a previous programme, such as applicants who have completed the Improving Operational Performance Level 2 framework (Performing Engineering Operations Level 2 pathway), then they will be able to accredit these against the requirements of the Level 3 Extended Diploma. In such circumstances this would result in the minimum hours requirements for the relevant pathway being reduced by a minimum of 123 hours and a minimum value of 27 credits (depending on the PEO units completed).

The Level 3 NVQ Extended Diplomas include a number of Performing Engineering Operations (PEO) Level 2 NVQ units. It is strongly recommended that the PEO units are delivered and assessed off the job in a sheltered and realistic work environment. This will ensure that Apprentices have attained a minimum and safe level of skills, knowledge and understanding in the occupational area prior to entering the workplace, thus minimising the risk of injury to themselves and other employees and the potential of increased costs incurred by the employer such as damaged tools/equipment, scrapped materials and components.

In order to ensure the safe transition to the workplace prior to being exposed to the hazards of the industrial environment, Apprentices must receive sufficient Health and Safety training covering both general and occupational specific requirements whilst undertaking the selected Level 2 NVQ PEO units off the job and in a sheltered and realistic work environment.

As a minimum the training programme should include the skills, knowledge and understanding requirements set out in the Performing Engineering Operations Level 2 (QCF) qualification.

Whilst undertaking the skill specific Level 2 QCF NVQ units as part of the Level 3 NVQ Extended Diploma, Training Providers may wish to consider registering Apprentices on the three Mandatory Units from the Level 2 NVQ Diploma in Performing Engineering Operations (QCF) qualification:

Unit 1: Working Safely in an Engineering Environment. QCF Unit Ref; L/600/5781
Unit 2: Carrying out Engineering Activities Efficiently and Effectively. QCF Unit Ref; D/600/5784
Unit 3: Using and Communicating Technical Information. QCF Unit Ref; M/600/5790

This has the advantage that if for any reason the apprentice is not able to complete the Level 3 NVQ Extended Diploma they would have achieved sufficient units to claim the Level 2 NVQ Diploma in Performing Engineering Operations (QCF).

Wider key skills assessment and recognition (Wales)

Improving own learning and performance

Improving own learning and performance is an essential component of the Apprenticeship in Composite Engineering at Level 3.
The requirement is at Level 2.

Working with others

Working with others is an essential component of the Apprenticeship in Composite Engineering at Level 3.
The requirement is at Level 2.

Problem solving

Although the ability to problem solve is required in many composite engineering development and manufacturing processes, it is dealt with 'on-the-job' within the NVQ and technical certificate rather than in the abstract. Therefore problem solving does not form a specific part of the Wider Key requirements for this framework.

Additional employer requirements

There are no additional employer requirements.

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For more information visit
www.afo.sscalliance.org