

# **Welsh Apprenticeship Pathway**

## **in**

### **Engineering and Advanced Manufacturing Degree Apprenticeship**

The content of these Pathways have been agreed by Steering Group. These are the only apprenticeship Pathways in the Engineering sector approved for use in Wales that are eligible for Medr funding.

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## **LEARNING PROGRAMME CONTENT**

The Learning Programme provision shall comprise of three mandatory elements:

- Qualifications,
- Essential Skills
- On/off the job training

The total minimum credit value required for the:

Level 6: Mechanical Engineering Degree Apprenticeship is 378 credits.

Level 6: Electrical / Electronic Engineering Degree Apprenticeship is 378 credits.

Level 6: Advanced Manufacturing Engineering Degree Apprenticeship is 378 credits.

Level 6: Chemical Engineering Degree Apprenticeship is 378 credits.

Level 6: Integrated Engineering Degree Apprenticeship is 378 credits.

Level 6: Renewable Energy Engineering Degree Apprenticeship is 378 credits.

Level 6: Rail Engineering Degree Apprenticeship is 378 credits.

## **ENTRY REQUIREMENTS**

**General Entry Requirements for - Level 6 – Mechanical Engineering Degree Apprenticeship/ Electrical / Electronic Engineering Degree Apprenticeship/Advanced Manufacturing Engineering Degree Apprenticeship/Chemical Engineering Degree Apprenticeship/Integrated Engineering Degree Apprenticeship/Renewable Energy Engineering Degree Apprenticeship/Rail Engineering**

The Engineering and Advanced Manufacturing Degree Apprenticeship pathway at Level 6 is primarily suitable for applicants who have either completed A levels appropriate for university entrance, or who may have already completed a related apprenticeship at Levels 3, 4 or 5.

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

It is likely that applicants may be asked to undertake a variety of tests which will include English, maths and problem solving, supported by an employer interview.

These are not meant as a barrier to entry, but more to gauge the ability of the applicant to achieve the programme outcomes and to tailor the individual learning plan to meet their needs and those of the employer.

## **APPRENTICESHIP PATHWAY LEARNING PROGRAMME(S)**

### **Level 6: Mechanical Engineering Degree Apprenticeship**

#### **Qualifications**

Participants must achieve one of the following combined qualifications below.

BEng (Hons) Mechanical Engineering					
Awarding Body	Qualification No.	Credit Value	Total Qualification Time	Competence / Knowledge / Combined	Qualification Assessment Language(s)
University of South Wales	N/A	360	3600	Combined	English Only

University of Wales Trinity Saint David	N/A	360	3600	Combined	English Only
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BSc (Hons) Mechanical Engineering					
Awarding Body	Qualification No.	Credit Value	Total Qualification Time	Competence / Knowledge / Combined	Qualification Assessment Language(s)
University of South Wales	N/A	360	3600	Combined	English Only
University of Wales Trinity Saint David	N/A	360	3600	Combined	English Only

BEng (Hons) Mechanical and Manufacturing Engineering					
Awarding Body	Qualification No.	Credit Value	Total Qualification Time	Competence / Knowledge / Combined	Qualification Assessment Language(s)
University of Wales Trinity Saint David	N/A	360	3600	Combined	English Only

BEng (Hons) Materials Science					
Awarding Body	Qualification No.	Credit Value	Total Qualification Time	Competence / Knowledge / Combined	Qualification Assessment Language(s)
University of Wales Trinity Saint David	N/A	360	360	Combined	English Only

BEng (Hons) Industrial Engineering Design - Mechanical					
Awarding Body	Qualification No.	Credit Value	Total Qualification Time	Competence / Knowledge / Combined	Qualification Assessment Language(s)

Glyndwr University	N/A	360	3600	Combined	English Only
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BEng (Hons) Applied Mechanical Engineering Systems					
Awarding Body	Qualification No.	Credit Value	Total Qualification Time	Competence / Knowledge / Combined	Qualification Assessment Language(s)
Bangor University	N/A	360	3600	Combined	English Only

Please see [Annex 1](#) for the relationship between the competence and knowledge units within the combined qualification.

## Essential Skills Wales (ESW)

Essential Skills Wales qualifications assessment languages are English-Welsh

Level 6: Mechanical Engineering Degree Apprenticeship	Level	Minimum Credit Value
Communication	2	6
Application of Number	2	6
Digital Literacy	2	6

## On/Off the Job Training

Pathway	Minimum On the Job Training Hours	Minimum Off the Job Training Hours
Level 6: Mechanical Engineering Degree Apprenticeship	500	900

On/Off the Job Qualification details (Minimum Credit & Hours)

360 credits for competence and knowledge

The total amount of learning hours which includes both on and off-the-job training for the Mechanical Engineering Degree Apprenticeship is 1400.

Pathway duration approximately 36 months

On/Off the Job Essential Skills details (Minimum Credit & Hours)

- 6 credits / 60 GLH Level 2 Essential Skills Wales Communication
- 6 credits / 60 GLH Level 2 Essential Skills Wales Application of Number
- 6 credits / 60 GLH Level 2 Essential Skills Wales Digital Literacy

## **Level 6: Electrical / Electronic Engineering Degree Apprenticeship**

### **Qualifications**

Participants must achieve one of the following combined qualifications below.

BEng (Hons) Electrical and Electronic Engineering
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Awarding Body	Qualification No.	Credit Value	Total Qualification Time	Competence / Knowledge / Combined	Qualification Assessment Language(s)
University of South Wales	N/A	360	3600	Combined	English Only
University of Wales Trinity Saint David	N/A	360	3600	Combined	English Only

BSc (Hons) Electrical and Electronic Engineering					
Awarding Body	Qualification No.	Credit Value	Total Qualification Time	Competence / Knowledge / Combined	Qualification Assessment Language(s)
University of South Wales	N/A	360	3600	Combined	English Only
University of Wales Trinity Saint David	N/A	360	3600	Combined	English Only

BSc (Hons) Semiconductor Technologies					
Awarding Body	Qualification No.	Credit Value	Total Qualification Time	Competence / Knowledge / Combined	Qualification Assessment Language(s)
Glyndwr University	N/A	360	3600	Combined	English Only

BEng (Hons) Applied Electrical/Electronic Engineering Systems					
Awarding Body	Qualification No.	Credit Value	Total Qualification Time	Competence / Knowledge / Combined	Qualification Assessment Language(s)
Bangor University	N/A	360	360	Combined	English Only
BEng (Hons) Embedded Electronic Systems					

Awarding Body	Qualification No.	Credit Value	Total Qualification Time	Competence / Knowledge / Combined	Qualification Assessment Language(s)
University of Wales Trinity Saint David	N/A	360	360	Combined	English Only

## Essential Skills Wales (ESW)

Essential Skills Wales qualifications assessment languages are English-Welsh

Level 6: Electrical / Electronic Engineering Degree Apprenticeship	Level	Minimum Credit Value
Communication	2	6
Application of Number	2	6
Digital Literacy	2	6

## On/Off the Job Training

Pathway	Minimum On the Job Training Hours	Minimum Off the Job Training Hours
Level 6: Electrical / Electronic Engineering Degree Apprenticeship	500	900

On/Off the Job Qualification details (Minimum Credit & Hours)

360 credits for competence and knowledge.

The total amount of learning hours which includes both on and off-the-job training for the Electrical / Electronic Engineering Degree Apprenticeship is 1400.

Pathway duration approximately 36 months

On/Off the Job Essential Skills details (Minimum Credit & Hours)

- 6 credits / 60 GLH Level 2 Essential Skills Wales Communication
- 6 credits / 60 GLH Level 2 Essential Skills Wales Application of Number
- 6 credits / 60 GLH Level 2 Essential Skills Wales Digital Literacy

## **Level 6: Advanced Manufacturing Engineering Degree Apprenticeship**

### **Qualifications**

Participants must achieve one of the following combined qualifications below.

BEng (Hons) Advanced Manufacturing Operations					
Awarding Body	Qualification No.	Credit Value	Total Qualification Time	Competence / Knowledge / Combined	Qualification Assessment Language(s)
University of Wales Trinity Saint David	N/A	360	3600	Combined	English Only

BEng (Hons) Manufacturing Systems Engineering					
Awarding Body	Qualification No.	Credit Value	Total Qualification Time	Competence / Knowledge / Combined	Qualification Assessment Language(s)
University of Wales Trinity Saint David	N/A	360	3600	Combined	English Only

BEng (Hons) Advanced Manufacturing Engineering					
Awarding Body	Qualification No.	Credit Value	Total Qualification Time	Competence / Knowledge / Combined	Qualification Assessment Language(s)
Swansea University	N/A	360	3600	Combined	English Only

BEng (Hons) Aeronautical and Manufacturing Engineering					
Awarding Body	Qualification No.	Credit Value	Total Qualification Time	Competence / Knowledge / Combined	Qualification Assessment Language(s)
Swansea University	N/A	360	360	Combined	English Only

BEng (Hons) Production Engineering					
Awarding Body	Qualification No.	Credit Value	Total Qualification Time	Competence / Knowledge / Combined	Qualification Assessment Language(s)
Glyndwr University	N/A	360	3600	Combined	English Only

  

BSc Engineering Management					
Awarding Body	Qualification No.	Credit Value	Total Qualification Time	Competence / Knowledge / Combined	Qualification Assessment Language(s)

University of Wales Trinity Saint David	N/A	360	3600	Combined	English Only
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BSc Supply Chain and Logistics					
Awarding Body	Qualification No.	Credit Value	Total Qualification Time	Competence / Knowledge / Combined	Qualification Assessment Language(s)
University of Wales Trinity Saint David	N/A	360	3600	Combined	English Only

Please see [Annex 1](#) for the relationship between the competence and knowledge units within the combined qualification.

### Essential Skills Wales (ESW)

Essential Skills Wales qualifications assessment languages are English-Welsh

Level 6: Advanced Manufacturing Engineering Degree Apprenticeship	Level	Minimum Credit Value
Communication	2	6
Application of Number	2	6
Digital Literacy	2	6

### On/Off the Job Training

Pathway	Minimum On the Job Training Hours	Minimum Off the Job Training Hours
Level 6: Advanced Manufacturing	500	900

Engineering Degree Apprenticeship		
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On/Off the Job Qualification details (Minimum Credit & Hours)

360 credits for competence and knowledge

The total amount of learning hours which includes both on and off-the-job training for the Advanced Manufacturing Engineering Degree Apprenticeship is 1400.

Pathway duration approximately 36 months

On/Off the Job Essential Skills details (Minimum Credit & Hours)

- 6 credits / 60 GLH Level 2 Essential Skills Wales Communication
- 6 credits / 60 GLH Level 2 Essential Skills Wales Application of Number
- 6 credits / 60 GLH Level 2 Essential Skills Wales Digital Literacy

## **Level 6: Chemical Engineering Degree Apprenticeship**

### **Qualifications**

Participants must achieve one of the following combined qualifications below.

BSc (Hons) Ordnance, Munitions & Explosives (Technical Research & Development)					
Awarding Body	Qualification No.	Credit Value	Total Qualification Time	Competence / Knowledge / Combined	Qualification Assessment Language(s)
University of Wales Trinity Saint David	N/A	360	3600	Combined	English Only

BEng (Hons) Ordnance, Munitions & Explosives (Safety)					
Awarding Body	Qualification No.	Credit Value	Total Qualification Time	Competence / Knowledge / Combined	Qualification Assessment Language(s)
University of Wales Trinity Saint David	N/A	360	3600	Combined	English Only

BEng (Hons) Ordnance, Munitions & Explosives (Manufacturing & Processing)					
Awarding Body	Qualification No.	Credit Value	Total Qualification Time	Competence / Knowledge / Combined	Qualification Assessment Language(s)
University of Wales Trinity Saint David	N/A	360	3600	Combined	English Only

BEng (Hons) Ordnance, Munitions & Explosives (Breakdown & Disposal)					
Awarding Body	Qualification No.	Credit Value	Total Qualification Time	Competence / Knowledge / Combined	Qualification Assessment

					Language(s)
University of Wales Trinity Saint David	N/A	360	360	Combined	English Only

BEng (Hons) Ordnance, Munitions & Explosives (Test & Evaluation)					
Awarding Body	Qualification No.	Credit Value	Total Qualification Time	Competence / Knowledge / Combined	Qualification Assessment Language(s)
University of Wales Trinity Saint David	N/A	360	360	Combined	English Only

Please see [Annex 1](#) for the relationship between the competence and knowledge units within the combined qualification.

## Essential Skills Wales (ESW)

Essential Skills Wales qualifications assessment languages are English-Welsh

Level 6: Chemical Engineering Degree Apprenticeship	Level	Minimum Credit Value
Communication	2	6
Application of Number	2	6
Digital Literacy	2	6

## On/Off the Job Training



Pathway	Minimum On the Job Training Hours	Minimum Off the Job Training Hours
Level 6: Chemical Engineering Degree Apprenticeship	500	900

On/Off the Job Qualification details (Minimum Credit & Hours)

360 credits for competence and knowledge

The total amount of learning hours which includes both on and off-the-job training for the Chemical Engineering Degree Apprenticeship is 1400.

Pathway duration approximately 36 months

On/Off the Job Essential Skills details (Minimum Credit & Hours)

- 6 credits / 60 GLH Level 2 Essential Skills Wales Communication
- 6 credits / 60 GLH Level 2 Essential Skills Wales Application of Number
- 6 credits / 60 GLH Level 2 Essential Skills Wales Digital Literacy

## **Level 6: Integrated Engineering Degree Apprenticeship**

### **Qualifications**

Participants must achieve one of the following combined qualification below.

BEng (Hons) Integrated Engineering					
Awarding Body	Qualification No.	Credit Value	Total Qualification Time	Competence / Knowledge / Combined	Qualification Assessment Language(s)
Cardiff University	N/A	360	3600	Combined	English Only

Please see [Annex 1](#) for the relationship between the competence and knowledge units within the combined qualification.

### Essential Skills Wales (ESW)

Essential Skills Wales qualifications assessment languages are English-Welsh

Level 6: Integrated Engineering Degree Apprenticeship	Level	Minimum Credit Value
Communication	2	6
Application of Number	2	6
Digital Literacy	2	6

### On/Off the Job Training

Pathway	Minimum On the Job Training Hours	Minimum Off the Job Training Hours
Level 6 : Integrated Engineering Degree Apprenticeship	500	900

On/Off the Job Qualification details (Minimum Credit & Hours)

360 credits for the combined competence and knowledge.

The total amount of learning hours which includes both on and off-the-job training for the Integrated Engineering Degree Apprenticeship 1400.

Pathway duration approximately 36 months

On/Off the Job Essential Skills details (Minimum Credit & Hours)

- 6 credits / 60 GLH Level 2 Essential Skills Wales Communication
- 6 credits / 60 GLH Level 2 Essential Skills Wales Application of Number
- 6 credits / 60 GLH Level 2 Essential Skills Wales Digital Literacy

## **Level 6: Renewable Energy Engineering Degree Apprenticeship**

### **Qualifications**

Participants must achieve one of the following combined qualification below.

BEng (Hons) Low Carbon Energy, Efficiency and Sustainability
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Awarding Body	Qualification No.	Credit Value	Total Qualification Time	Competence / Knowledge / Combined	Qualification Assessment Language(s)
Glyndwr University	N/A	360	3600	Combined	English Only

Please see [Annex 1](#) for the relationship between the competence and knowledge units within the combined qualification.

## Essential Skills Wales (ESW)

Essential Skills Wales qualifications assessment languages are English-Welsh

Level 6: Renewable Energy Engineering Degree Apprenticeship	Level	Minimum Credit Value
Communication	2	6
Application of Number	2	6
Digital Literacy	2	6

## On/Off the Job Training

Pathway	Minimum On the Job Training Hours	Minimum Off the Job Training Hours
Level 6: Renewable Energy Engineering Degree Apprenticeship	500	900

On/Off the Job Qualification details (Minimum Credit & Hours)

360 credits for the competence and knowledge.

The total amount of learning hours which includes both on and off-the-job training for the Renewable Energy Engineering Degree Apprenticeship is 1400.

Pathway duration approximately 36 months

On/Off the Job Essential Skills details (Minimum Credit & Hours)

- 6 credits / 60 GLH Level 2 Essential Skills Wales Communication
- 6 credits / 60 GLH Level 2 Essential Skills Wales Application of Number
- 6 credits / 60 GLH Level 2 Essential Skills Wales Digital Literacy

## **APPRENTICESHIP PATHWAY LEARNING PROGRAMME(S)**

### **Level 6: Railway Engineering Degree Apprenticeship**

#### **Qualifications**

Participants must achieve one of the following combined qualifications below.

BSc (Hons) Railway Engineering. – <b>(Civil/Track)</b>					
Awarding Body	Qualification No.	Credit Value	Total Qualification Time	Competence / Knowledge / Combined	Qualification Assessment Language(s)
University of South Wales	N/A	360	3600	Combined	English Only

BSc (Hons) Railway Engineering <b>(Electro/Mechanical)</b>					
Awarding Body	Qualification No.	Credit Value	Total Qualification Time	Competence / Knowledge / Combined	Qualification Assessment Language(s)
University of South Wales	N/A	360	3600	Combined	English Only

Please see [Annex 2](#) for the relationship between the competence and knowledge units within the combined qualification.

### **Essential Skills Wales (ESW)**

Essential Skills Wales qualifications assessment languages are English-Welsh

Level 6: Railway Engineering Degree Apprenticeship	Level	Minimum Credit Value
Communication	2	6
Application of Number	2	6
Digital Literacy	2	6

## On/Off the Job Training

Pathway	Minimum On the Job Training Hours	Minimum Off the Job Training Hours
Level 6: Railway Engineering Degree Apprenticeship	500	900

On/Off the Job Qualification details (Minimum Credit & Hours)

360 credits for competence and knowledge

The total amount of learning hours which includes both on and off-the-job training for the Railway Engineering Degree Apprenticeship is 1400.

Pathway duration approximately 42 months



On/Off the Job Essential Skills details (Minimum Credit & Hours)

- 6 credits / 60 GLH Level 2 Essential Skills Wales Communication
- 6 credits / 60 GLH Level 2 Essential Skills Wales Application of Number
- 6 credits / 60 GLH Level 2 Essential Skills Wales Digital Literacy

## **OTHER ADDITIONAL REQUIREMENTS**

**Railtrack Access - H&S License**

## **JOB ROLES**

The latest version of the job roles and job descriptions for this Pathway can be found [here](#)  
Link to summary/Platform

## **PROGRESSION**

Progression from the Level 6 Degree Apprenticeship – Mechanical Engineering Degree Apprenticeship/ Electrical / Electronic Engineering Degree Apprenticeship/Advanced Manufacturing Engineering Degree Apprenticeship/Chemical Engineering Degree Apprenticeship/Integrated Engineering Degree Apprenticeship/Renewable Energy Engineering Degree Apprenticeship /Railway Engineering

Progression for those who have completed a degree apprenticeship in Mechanical Engineering (Level 6):

- Employment as a Mechanical Engineer
- Master's Degrees in the relevant specialism

Progression for those who have completed a degree apprenticeship in Electrical / Electronic Engineering (Level 6):

- Employment as an Electrical / Electronic Engineer
- Master's degrees in the relevant specialism.

Progression for those who have completed a degree apprenticeship in Advanced Manufacturing Engineering (Level 6):

- Employment as a Manufacturing
- Master's degrees in the relevant specialism

Progression for those who have completed a degree apprenticeship in Chemical Engineering (Level 6):

- Employment as a Chemical Engineer
- Master's degrees in the relevant specialism.

Progression for those who have completed a degree apprenticeship in Integrated Engineering (Level 6):

- Employment as an Industrial Engineer
- Master's Degrees in the relevant specialism.

Progression for those who have completed a degree apprenticeship in Renewable Energy Engineering (Level 6):

- Employment as a Renewable Energy Engineer
- Master's Degrees in the relevant specialism.

Progression for those who have completed a degree apprenticeship in Railway Engineering (Level 6):

- Employment as a Railway Engineer (Sector Specific)
- Master's Degrees in the relevant specialism

These Degree Apprenticeships also provides excellent preparation towards professional registration. Professional recognition The Institution of Mechanical Engineers (IMechE), the Institution of Engineering and Technology (IET) and the Royal Aeronautical Society (RAeS) recognise that this apprenticeship pathway provides the necessary skills, knowledge and experience to allow apprentices to apply for Engineering Technician status within their institutions.

The apprenticeship does not confer automatic membership of any of these institutions as an Engineering Technician. Apprentices are free to apply to the institution of their choice and engage the process of registration.

Please note each institution will charge a registration fee, details of these are available through the weblinks below.

[www.aerosociety.com](http://www.aerosociety.com)

[www.theiet.org](http://www.theiet.org)

## **EQUALITY & DIVERSITY**

It is important that apprenticeship Pathways are inclusive and can demonstrate an active approach to identifying and removing barriers to entry and progression. Pathways should advance equality of opportunity between persons who share protected characteristics and those persons who do not as identified in the Equality Act 2010.

The Protected characteristics identified in the Equality Act are age, disability, gender re-assignment, race, religion or belief, sex, sexual orientation, pregnancy and maternity. Marriage and civil partnership is also included although only in respect of the requirement to eliminate discrimination in employment.

Training providers and employers **MUST** also comply with the other duty under the Equality Act 2010 to ensure that applicants are not discriminated against in terms of entry to the industry based upon those nine protected characteristics

There are 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 and male-dominated:

- 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.

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

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

Providers and employers need 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.

## **EMPLOYMENT RESPONSIBILITIES AND RIGHTS (ERR)**

Employment Responsibilities and Rights (ERR) is no longer compulsory. But it is recommended

that all apprentices receive a company induction programme.

### **Training Provider responsibilities**

It is the responsibility of the Training Provider and Employer to ensure that the requirements of

this pathway are delivered in accordance with the Welsh Government/Medr Apprenticeships

Guidance.

**Further information may be obtained from: Medr**

### **Annex 1**

**Level 6: - Mechanical Engineering Degree Apprenticeship/ Electrical / Electronic Engineering Degree Apprenticeship/Advanced Manufacturing Engineering Degree Apprenticeship/Chemical Engineering Degree Apprenticeship/Integrated Engineering Degree Apprenticeship/Renewable Energy Engineering Degree Apprenticeship / Railway Engineering Apprenticeship**

#### **Relationship between competence and knowledge qualifications**

This is a combined degree qualification that delivers both the knowledge and competence requirements with minimum of 360 credits as set out in the Engineering and Advanced Manufacturing degree apprenticeship learning and skills pathway outcomes specification, March 2019.

### **Annex 2**

Level 6 Railway Engineering

Role Descriptor

Railway Engineers may work in a technical office, remotely or at railway operational/engineering worksites.

Typical job roles would include Senior Track Engineer, Senior Signalling & Control Systems Engineer, Senior Rail Civil Engineer, Simulation Systems Engineer, Senior Rail Mechanical Engineer, Rail Plant Engineer, Senior Rail Systems Integration Engineer, Senior Telecoms Engineer, Lead Systems Engineer, Senior Traction and Rolling Stock Engineer, Senior Electrification Engineer.

A Railway Engineer is an operational leadership role; someone working in the industry who can take responsibility for people and the work in hand within a conventional or high-speed railway context.

They have and will gain expertise in one of the following disciplines: Railway Civils;/Track; Railway Signalling/Telecommunications, or Railway Electrical/Mechanical Maintenance.

They lead people or processes in one of these distinct areas in tasks such as managing integrated safe design, construction, installation, maintenance, renewal, or decommissioning. All with the aim of providing a safe and reliable railway system.

Their work will require a deep knowledge and understanding of how the railway works as an integrated, complex system from an operational perspective. They are professional engineers with technical engineering skills which they apply in a broad range of management and leadership activities. They are accountable for their own work and others.

### **Relationship between competence and knowledge qualifications**

These are combined assessment Engineering/Manufacturing (Railway Pathway) degree qualifications that deliver both the knowledge and competence requirements as set out in the individual learning and skills pathway outcomes (high and low) available [here](#)

The access to Railway Working Licenses will also be included as an additional outcome for all learners to assess Health and Safety Competence.

### **Railway Engineering Civil/Track, Electro/Mechanical variations.**

### **Core Skills**

A Railway Engineering degree apprenticeship graduate should be able to take responsibility for activities such as:

- The development of work proposals that properly describe the rail engineering requirements, scope, and operational performance targets.
- To engage relating to robust challenges to/from colleagues, making use of their specific rail expertise, to monitor and manage the business and technical remit and thereby optimise results.
- Manage all rail engineering and development activities so that they are affordable and safe.

- The quality, accuracy, and timely delivery of work in a railway/safety critical context; proactively identifying solutions to problems and areas for improvement.
- Applying their expertise in a regulated sector to assess and manage risk to avoid railway asset, equipment, process and systems failures.
- Identifying the standards required by clients and other stakeholders and implement effective procedures for managing, recording, and improving quality.
- Management of infrastructure change activities in a way that contributes to sustainable development, implementing best practice.
- Management of legal and contractual matters relating to infrastructure change activities within commercial and legal constraints to ensure effective project outcomes.
- Investigation of challenges, causes, and effects and determine effective solutions.
- Management and appraisal of team members and specialist contractors, resolving conflicts ensuring effective teamwork.

## Core Knowledge

- **Safe and professional working practices** including rail specific legislation, regulation.

[e.g. Common Safety Method Risk Assessment (CSM RA), CDM and Systems Integration and Requirements Management], industry procedures, safety and quality requirements, risk management and environmental impacts. A thorough understanding of the need for compliance with corporate policies including sustainability, ethics, equality, diversity, and human factors, and an ability to constructively challenge non-compliance.

- **Keep themselves and others safe** by implementing and managing safe working practices and challenging unsafe practices. Promote and comply with railway/statutory regulations and organisational or project safety requirements, including competence and safe access to railway sites. Undertake and manage risk assessments / hazard reviews.



- **Support the technical input to the development of railway standards, specifications and means of compliance;** contribute to design/development of engineering solutions.

- **Manage value engineering and whole life costing,** evaluating information from diverse sources to develop, test and cost options: drafting rail specifications or detailed designs.

- **Deliver rail and rail systems engineering solutions effectively** including planning, Resource allocation and management and delivery to rail industry specifications. Manage change and risk, monitor work, and make decisions and complex critical judgements.

- **Business planning,** including financial planning (forecasts and budgets and operational/business performance using a variety of analytical techniques), commercial impacts, contractual obligations, supply chain management, logistics and resource constraints.

- **Team and role theory and the development of high performing teams and individuals.** Have a good understanding of how to attract, recruit, develop and retain people in the sector, including. performance management techniques and succession planning. A thorough knowledge of professional and railway legislative working practices and the impacts and benefits of these. Understanding of organisational change management and its history in the rail sector, transformational leadership theory and processes.

- **Collaborative working techniques** e.g. sharing best practice, including an understanding of conflict resolution, and partner, stakeholder and supplier relationship management including negotiation, influencing, and effective networking within a regulated business.

## **Knowledge & Skills Specific to Options within Pathway**

### **Railway Civil/Track Engineering specific Knowledge & Skills:**

**Knowledge** – will know and have a deep understanding and experience of:

- The requirements, methods and techniques for the installation and maintenance of  
the rail track support and track foundation.
- The impact of the railway environment e.g. geotechnics, structures, bridges, tunnels,  
embankments, cuttings, vegetation and drainage, and such interfaces as occur  
between the physical railway assets and systems
- The application of rail track standards e.g. Eurocodes, TSIs and industry norms.
- Materials used in the railway e.g. suitability, strength, properties, plastics, timbers etc.

**Skills** – will have the ability to:

- Apply civil engineering skills e.g. geotechnics to support the effective performance and  
operation of the business.

- Provide expert advice and leadership specific to the Rail Civils discipline, but cognisant of how the railway works as an integrated, complex system.
- Apply and manage a wide range of Rail Civils skill-sets e.g. geotechnics, structures, bridges, tunnels, embankments, cuttings, vegetation and drainage in order to support and manage research, development, design, procurement, logistics, planning, delivery, quality assurance,
- Inspection, testing, installation, commissioning, maintenance, life cycle management, decommissioning and environmental compliance.
- Apply and manage a wide range of track engineering skill-sets e.g. surveying for track design (for heavy rail and light rail projects) to support the effective performance and operation of the business.
- Provide expert advice specific to the track discipline, but cognisant of how the railway works as an integrated, complex system.

## **Electro, Mechanical specific Knowledge & Skills:**

**Knowledge** – will know and have a deep understanding and experience of:

Electrical, Mechanical or Services related to the railways including:

- The physical and systems interfaces between electrical, electronic and mechanical rail assets and systems and other aspects of the railway and operating requirements, Including implications and constraints of these.
- Interface with track assets and bonding/connections.
- Asset reliability, availability, maintainability within defined safety parameters.
- The requirements, methods and techniques and associated technologies including bespoke rail telecommunications for safe routing, spacing and control of train's e.g. Fail safe principles,
- Signal point failure, degraded mode, fixed block signalling, and automatic train protection.
- The application of telecommunication engineering systems
- The operating principles in legacy or modern rail specific telecommunication technologies.
- The physical interfaces between assets and optimisation processes e.g. reliability.

**Skills** – will have the ability to:

- Undertake standards review, operational practice, approvals and assessment of relevant rail asset types in line with technical knowledge.
- Approve and certify rail related electrical and mechanical and building services assets, as appropriate within the defined safety legislation e.g. building regulations.
- Support rail telecommunication, network and digital engineering design, application, configuration, operation, maintenance or decommissioning and disposal.
- Undertake company standards review and development as a designated subject matter expert within the discipline.
- Operational rules for the railways and how signalling and control systems operate within these Parameters
- Apply rail signalling and control systems skills e.g. independence of design checking and verification, assessing risk, manage interdisciplinary reviews.
- Produce rail signalling and control solutions for the railway industry based on known and defined concepts and principles and new and novel rail management system approaches.

## Transferable Skills and Responsibilities

### Graduates will demonstrate:

**Communication and influencing skills,** choosing appropriate communication media to suit the audience and situation, checking for understanding, and consider and build on ideas of others to influence outcomes. Demonstrates and promotes regular communication with rail colleagues, clients, the public and other stakeholders.

**Professionalism,** dependability, determination, consistency, resilience, honesty and integrity.

Will respect others, act ethically and contribute to sustainable development of the railway.

Acts as an ambassador/role model for their professional discipline.

### **A proactive self-disciplined, self-motivated and motivational approach to work.**

**Safe working practices,** to approved rail industry standards, and ensures others do likewise.

Identifies and takes responsibility for own obligations for health, safety and welfare issues.

Always demonstrates safety leadership.

**Collaborative working** and actively engages others in doing so. Is aware of personal actions

and impact they may have on others, maintaining effective relationships with rail colleagues,

clients, suppliers and the public; often a key representative of the company.

**A quality focus,** promoting continuous improvement/different techniques [e.g. Lean].

**Continuous Professional Development**, giving and receiving constructive feedback, and willing to learn new skills and adjust to change. Identifies, undertakes, and records CPD necessary to maintain and augment railway competences. Maintains and extends a sound theoretical approach to the application of technology in rail engineering practice. recognising technological, political, and economic developments affecting the industry.

**Contribute to and attend Senior Management and Executive meetings** and report on both complex technical and financial issues both verbally and in writing.

**Manage financial systems, forecasts and budgets** and operational / business performance using a variety of analytical techniques. Able to contribute to commercial and contractual reviews within a railway/regulated industry.

**Use evidence based approaches** to problem solving and decision making. Manage and contribute to railway research and development of products and processes with cross-disciplinary collaboration. Conduct statistically sound appraisal of data, applying root

cause analysis, and using evidence drawn from best practice to improve effectiveness.

**Lead /manage multi-disciplinary teams** to effectively delegate tasks, identifying appropriate mentorship and coaching required, in line with talent management and succession planning. Able to apply change management processes.

**Work effectively and collaboratively,** individually and as part of a team, being aware of personal actions and the impact they may have on others. Develop and maintain effective relationships with rail colleagues, clients, suppliers and the public at their level of influence [e.g. rail industry, local authority, and suppliers].