HIGH SPEED RAIL

APPRENTICESHIPS GUIDE

Version 1.0 June 2017

The National College

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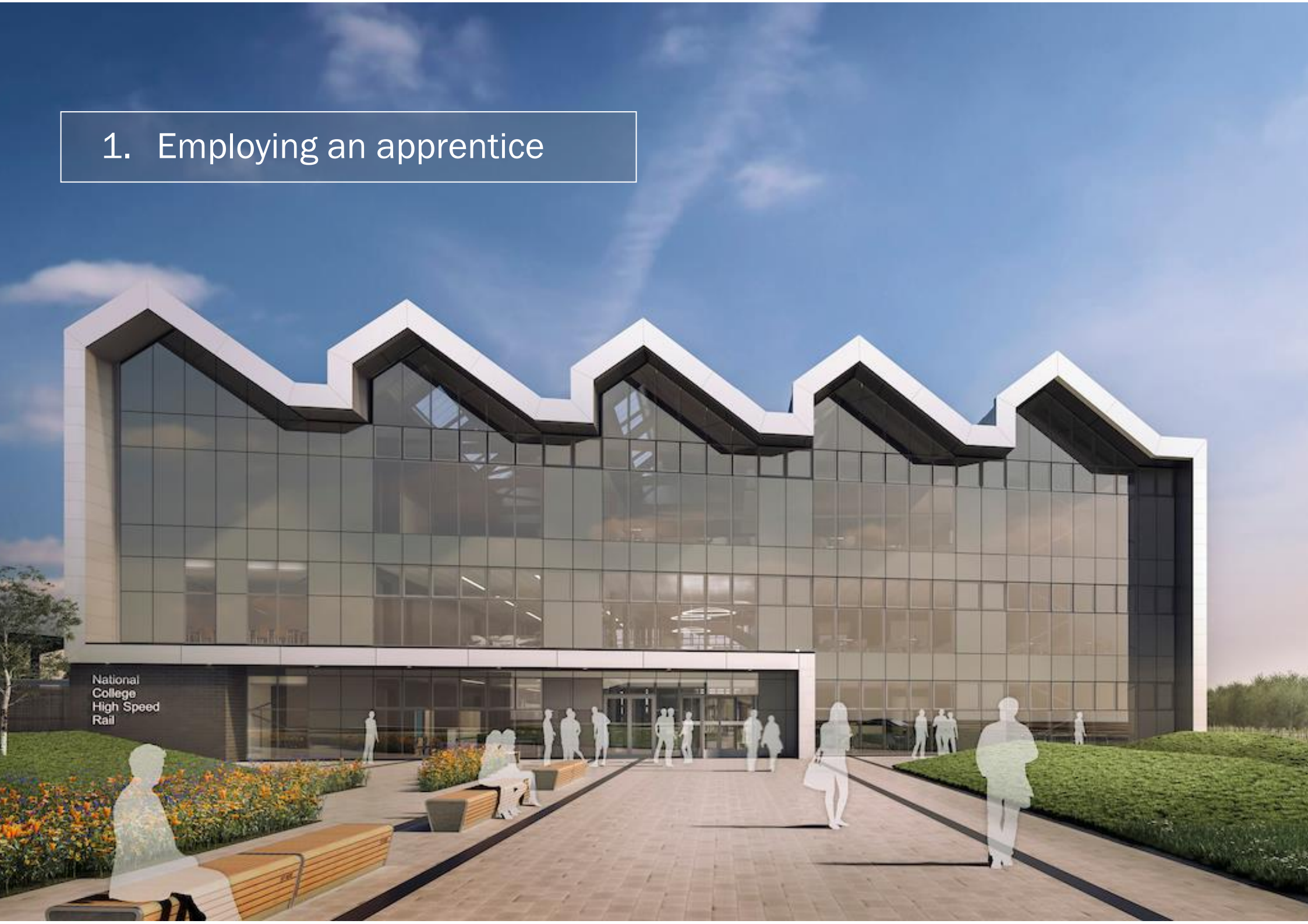
1. Employing an apprentice



Introduction

This document is intended for businesses who are considering placing current employees as apprentices with the National College; or recruiting new apprentices into their business. It gives an overview of the things you should consider as you prepare to support your apprentice, to ensure that both the individual apprentice, and your company, can get the most out of this experience.

Employing an apprentice

Many of you will have experience of employing an apprentice, and all that it entails. For those that are new to the idea, useful guides can be found at:

https://www.gov.uk/take-on-an-apprentice

http://www.acas.org.uk/index.aspx?articleid=3816

Rights and responsibilities

You are the employer and have the same responsibilities you have for any of your employees. Similarly, your apprentice has the same rights as an employee, as any of your other staff members.

Apprentice salaries

Expected salaries can vary significantly, and you should give due consideration to how attractive salaries can attract the very best candidates into your business. However, you must abide by guidance on the minimum wage. In brief, aapprentices are entitled to the apprentice rate if they're either:

- aged under 19
- aged 19 or over and in the first year of their apprenticeship

Apprentices are entitled to the minimum wage for their age if they both:

- are aged 19 or over
- have completed the first year of their apprenticeship

Latest information on minimum wage rates can be found here:

https://www.gov.uk/national-minimum-wage-rates

Contract of employments

An apprentice is considered to be an employee and therefore needs a contract of employment. One of the main objectives of an apprenticeship is for you to train your future workforce, and you should therefore intend for there to be a permanent role for the apprentice on completion of their study.

Annual leave

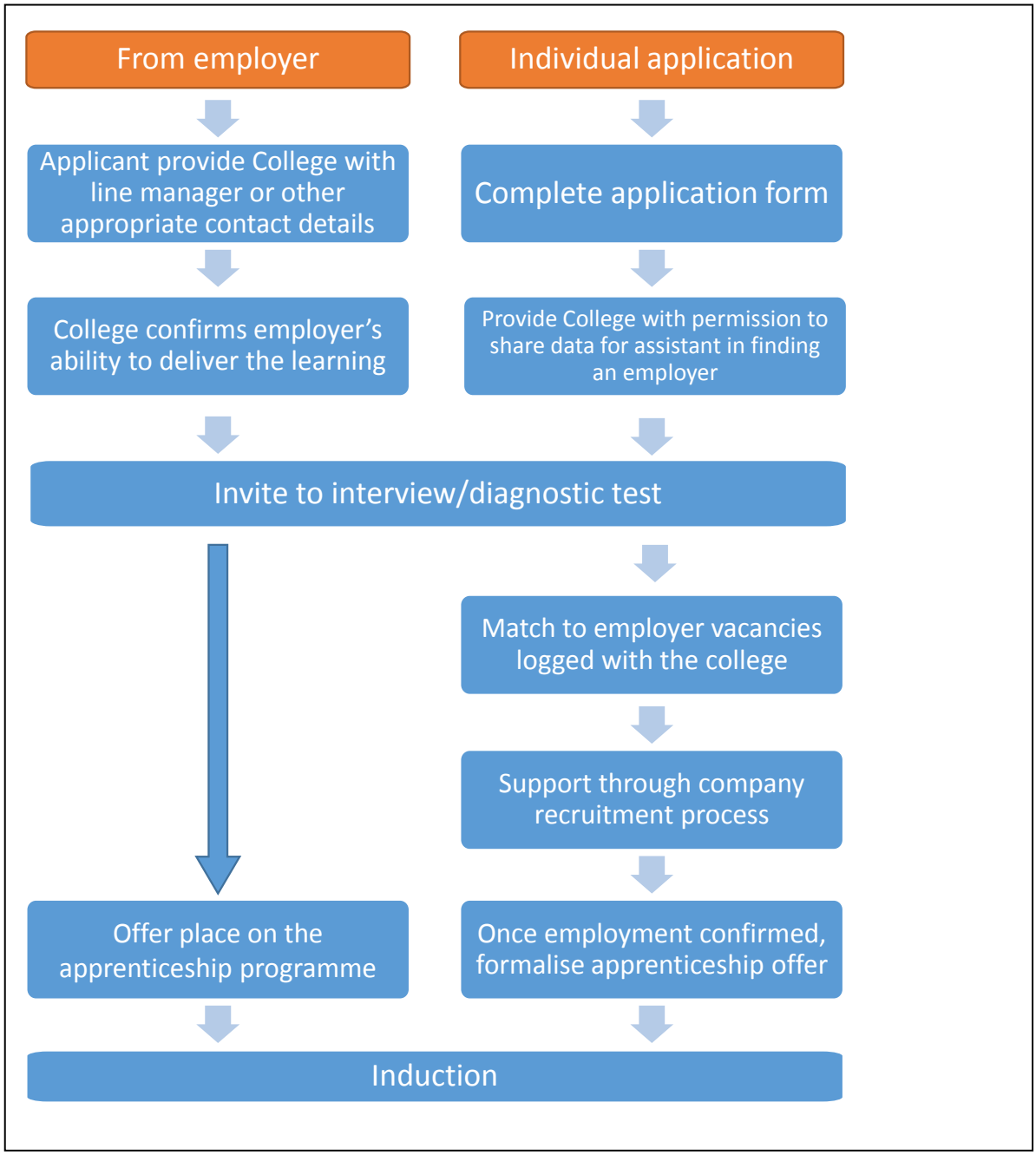
As their employer, the management of annual leave is at your discretion, however, we would expect annual leave not to be granted during block release periods.

How many hours a week do they have to work?

An apprentice will have a normal working work, as per your company's standard procedure. When in college, they will be studying five days a week, with a total of 32 hours.

Apprentices must be employed for at least 30 hours per week, no more than eight hours per day.

What is the assessment process?



We are able to support companies with the assessment of their candidate's suitability of the apprenticeship programme. This can involve online testing of English and maths. Our curriculum team are also able to support with interview days.

Recruiting apprentices

Many companies have their own recruitment processes, and these can be easily applied to the recruiting of an apprentice. However, the National College is able to support in this process to ensure that the potential employee is both a good potential employee, and has the academic and technical potential to succeed at the apprenticeship.

We can advertise your vacancy more widely, using our website and social media channels.

We can also share and promote your vacancies to the pool of candidates who apply directly to the National College, referring them to your website to make a direct application.

If you are a large organisation with direct grant funding, you can also register to advertise your vacancy via www.getingofar.gov.uk/

Supporting your apprentice during their programme

We recommend that you allocate a dedicated point of support for your apprentice, who will be responsible for the on-the-job element of their training. This person can then liaise with college staff and the apprentice, to ensure that everything is on track. The National College will supply you with a single point of contact, who will be looking after your apprentice during their in-college training and will be the named person who will ensure that all training is fulfilling the requirements of the standard. The employer should support their apprentice in providing opportunities within the workplace to develop the knowledge, skills and behaviour within the standard. This will include the apprentice completing an extensive work based project during the apprenticeship which will be used as part of the end point assessment. The employer will need to confirm at an appropriate point that the apprentice has met the standard and is ready to enter the end point assessment phase.

When should we be considering recruiting an apprentice?

Many companies have established recruitment periods, while others do it on a more ad hoc basis. This will be influenced by the number of apprentices you are looking to apply: with larger cohorts demanding more intensive resource. It may be useful to think about the standard recruitment timeline in your organisation, and then add some additional time in case you need to include an assessment element. To allow us to on board an apprentice to their programme, we would ideally like you to have notified us of candidates by the following timeline:

Programme start date	College notified of candidates
September 2017	Thursday 31st August
January 2018	Thursday 14th December
April 2018	Thursday 29th March

However, we are happy to work with you to ensure that you are able to start your apprentices.

Our curriculum

A high level explanation of our curriculum can be found in our prospectus and on our website at www.nchsr.ac.uk.

- Appendix 1 is the apprenticeship standard
- Appendix 2 is the core curriculum amplification
- Amplification detail for Civil Engineering, Systems Engineering, Track Systems and Operations/Departmental Manager are available on request.

What are our entry requirements?

Entry requirements for our apprenticeship programmes are as below:

Our High Speed Rail and Infrastructure Technician is a level 4 apprenticeship. The typical duration is 36 months, depending on previous experience and access to opportunities to gain the full range of competences. Typically an apprentice might be expected to have achieved appropriate A-Levels, a BTEC National Diploma in an appropriate vocational area, other Level 3 vocational qualifications, or other industry experience. We will evaluate every application on its individual merits, along with you, as the employer.

Our Operations / Departmental Manger is a level 5 apprenticeship. The typical duration is 30 months, depending on previous experience and access to opportunities to gain the full range of competences. Typically an apprentice might be expected to have achieved appropriate A-Levels, a BTEC National Diploma in an appropriate vocational area, other Level 3 vocational qualifications, or other industry experience. We will evaluate every application on its individual merits, along with you, as the employer.

Professional accredition

Apprentices who successfully complete their apprenticeship may apply for recognition to whichever professional institution is relevant to their specialism. The apprenticeship standard is mapped to the EngTech component of the UK-SPEC standards.

What are the term dates / block release?

Block release periods will be five days per week, apprentices will be at the college for 32 hours per week, on average.

Higher Apprenticeship in High Speed Rail Technician will be a twelve week core, followed by nine 2-week blocks – this is 30 weeks in total over a 3 year period, which is the typical duration. This equates to 20% of time. Alternatively, it will be offered with a delivery model of a one week induction followed by a day release for three years, the day release is likely to be a Wednesday, but this is open to discussion. This will be followed by a flexible six month block to incorporate additional delivery and consolidate the formative assessment and prepare for the end-point assessment. This delivery option will be subject to viable cohort sizes.

Operations / Departmental Manager is an eight week block, followed by six 2 week blocks. This equates to 20% of time. Alternatively, it will be offered with a delivery model of a one week induction followed by a day release for two years, the day is likely to be a Thursday, but this is open to discussion. This will be followed by a flexible six month block to incorporate additional delivery, consolidate the formative assessment and prepare for the end-point assessment. This delivery option will be subject to viable cohort sizes.

Civil Engineering

Intake 1:

12 week block release – 25.9.17 – 14.12.17

2 week block release - 9.4.18 – 20.4.18

Intake 2:

12 week block release – 8.1.18 – 29.3.18

2 week block release - 16.7.18 – 26.7.18

Intake 3

12 week block release - 23.4.18 – 13.7.18

2 week block release – this will fall into academic year 2018/19 and dates will be confirmed shortly.

Track Systems

Intake 1:

12 week block release – 25.9.17 – 14.12.17

2 week block release - 9.4.18 – 20.4.18

Intake 2:

12 week block release – 8.1.18 – 29.3.18

2 week block release - 16.7.18 – 26.7.18

Intake 3

12 week block release - 23.4.18 – 13.7.18

2 week block release – this will fall into academic year 2018/19 and dates will be confirmed shortly.

Systems Engineering

Intake 1

12 week block release – 22.1.18 – 23.3.18 and 9.4.18 – 27.4.18 (note Easter in the middle)

2 week block release – 16.7.18 – 27.7.18

Intake 2

This will fall into academic year 2018/19 and dates will be confirmed shortly.

Operations / Departmental Manager

Intake 1

8 week block release - 9.10.17 – 31.11.17

2 week block release – 12.3.18 – 23.3.18

Intake 2

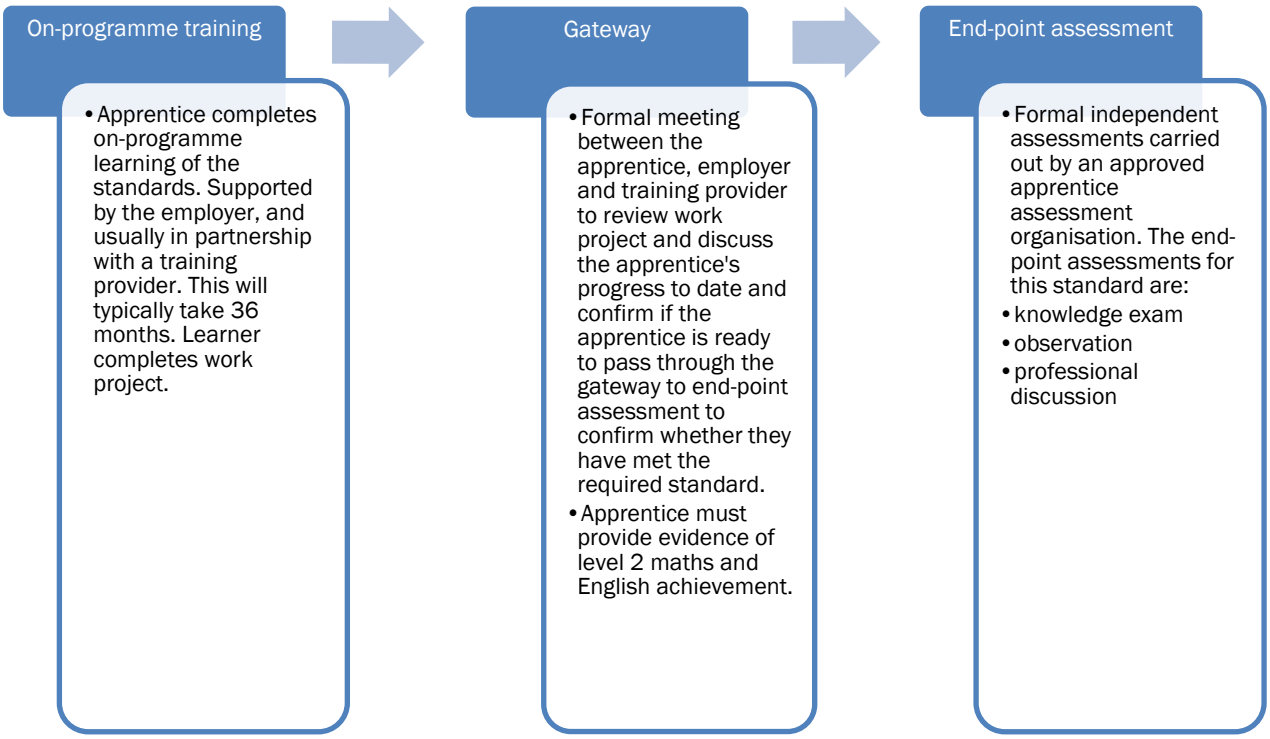
8 week block release – 8.1.18 – 2.3.18

2 week block release – 25.6.18 – 6.7.18

Mandatory qualifications

Our apprenticeships do not include a mandatory qualification. Success is measured via the independent end point assessment activities. Under the new apprenticeships standards, mandatory qualifications are not permitted, other than in very defined circumstances.

What is the end point assessment process?



What if I haven't secured an HS2 contract yet?

The timeline for the next phase of the HS2 procurement does not line up with the college start date. As industry leaders, you are aware of the skills shortage in the sector. The skills that our students will gain are transferable and will be valuable for your business in any eventuality. The timeframe of the 3 year apprenticeship, means that to be ready to meet your contractual commitments, investment in training needs to start now. We are asking you to contribute to revolutionising the skill standard of the industry as a whole. As a truly employer-led college, the college will fail or succeed based on the support that industry gives us.

How do I create appropriate work-based training for my apprentice if I have yet to secure any high speed work?

Think innovatively – look around at your wider business context and supply chain to source opportunities. Remember that all apprentices will undergo the 12 week core programme upon commencement, meaning that work based learning will not commence until January 2018 for our September 17 starts, and until April 2018, for our January 2018 intake.

Health and Safety

H&S is built into the core curriculum, and specific H&S aspects for options, are included in individual programmes. The college is committed to ensuring and health safety and welfare of its learners during their programmes. The Apprenticeship Engagement Manager or appropriate member of staff will oversee the H&S, and will be the first point of call for employers.

Support services

Each student will be assigned a named personal tutor who will be responsible for pastoral care; monitoring progress; supporting learning; delivering the cross college tutorial curriculum including British Values; liaising with work-placements to ensure well-being and appropriateness of training and experience; access to learning materials.

It is part of the College's vision to ensure non-traditional learners can benefit from education and training that leads to sustainable, high quality careers in the high speed rail industry. Specialist support services will be available to identify individual learning needs, plan support and deliver appropriate support programmes ensuring full accessibility for students with learning disabilities and difficulties. The College is appointing a Learner Experience Manager to oversee and manage student the development and implementation of learner support processes.

The College will require students to make effective use of the Virtual Learning Environment (VLE) to support learning, access and use learning materials, communication between staff and fellow students, access feedback from tutors and

monitor progress. The VLE will be a key strategy in providing academic support, monitoring and reviewing learners' progress and providing an effective communication vehicle for course related activity.

Dress code

During college hours, apprentices will wear appropriate PPE, this will be supplied by the employer in the workshop environment.

Accommodation

We do not have accommodation on either of the college sites. However, there is a plentiful supply of good value accommodation near to both sites. As all of our students are over 18, they will not be supervised in accommodation overnight. However, contact details will be made available for the college in the case of emergency overnight. Employers will meet the cost of accommodation for their employees.

Travel to college

It is the personal responsibility of the apprentice to get themselves to the college. However, some employers support their employees financially through payment of travel and expenses, relocation expenses or car sharing. You may like to consider these potential benefits in your recruitment.

Code of conduct

Apprentices will be expected to abide by a code of conduct, which covers behaviour expectations at college.

Funding and payments

While not yet finalised and approved by the ESFA (Education and Skills Funding Agency) we expect our Higher Apprenticeships to fall into the highest band of £27,000.

Our HNC has a tuition fee of £9250. You can sponsor or part-sponsor your employee to complete this qualification.

Levy payer

If you are an apprenticeship levy payer (i.e. you have a pay bill exceeding £3m per annum) you will pay this amount via your digital apprenticeship account.

https://www.gov.uk/government/publications/apprenticeship-levy-how-it-will-work/apprenticeship-levy-how-it-will-work

You can use the calculator found at www.fas.report to work out how this will affect your business.

We will advise you on how this process will work, once guidance is released by the ESFA.

Non-levy payer

The government has pledged to pay for 90% of the training costs of your apprenticeship, with you meeting the remaining 10% and as the employer, the salary costs of your apprentice. The government has not yet released details of how this payment mechanism will work – as soon as they do, we will make this information available.

Am I eligible for any grants or bursaries?

It is unlikely that you will be able to access grants for costs related to training. However, Local Enterprise Partnerships may have access to funds to support business growth, and one way to evidence and support growth is by skills development. You can search here

https://sheffieldcityregion.org.uk/

http://centreofenterprise.com/

We have a limited number of bursaries available to support individual students – details will be made available shortly on our website.

Oher training options

Higher Technical Certificate

This is currently not available on a part-time basis, but this may be available in the future.

CPD (Continuous Professional Development)

We will be offering a suite of short professional training programmes. More details will follow. If there is any training you are particularly interested in sourcing, please contact us.

Appendix one: Apprenticeship Standard for High Speed Rail and Infrastructure (HSRI) Advanced Technician

Occupational Profile: High speed rail is a specialist occupational area of work. High speed rail specialists include civil engineers, higher technicians in track, power and infrastructure, and operations managers. The High Speed Rail and Infrastructure Advanced Technician provides technical solutions across the construction, maintenance and operation of a high speed railway, as defined by their job role. They are responsible for the safe design, construction, installation, maintenance and operation of a high speed railway that provides a safe and reliable service for its customers. The Advanced Technician will need skills and knowledge relating to both high speed and conventional rail networks and infrastructure in order to manage the interface between the systems. High Speed Rail and Infrastructure Advanced Technicians will have core knowledge, skills and behaviours, and knowledge and skills in a specialist area.

Job roles include: High Speed Rail and Infrastructure Advanced Technician in civil engineering; track; systems engineering; power; command, control and communication systems; operations and rolling stock.

All apprentices will complete the core knowledge and skills and one of the options appropriate to their job role. The options are HSRI; Civil Engineering; Track; Systems Engineering; Command, Control and Communications; Rolling Stock; Power; Operations.

	Knowledge (The Advanced Technician will know and understand...)	Skills (The Advanced Technician will be able to...)
Health and Safety	The critical importance of safety and security in the conventional and the high speed railway industries, the principles of safe by design, system assurance, and health and safety legislation	a) Develop and maintain an effective safety culture. b) Embed a culture of health, welfare and safety compliance to ensure the health and safety of employees, customers, visitors and members of the public. c) Rigorously apply security procedures.
	The relationships of health and welfare strategies with safety in the workplace	a) Apply rigorous health and safety practices, comply with legislation and safety processes. b) Design safety into all aspects of the rail network, accounting for end-user requirements.
	The relevance of standards, policy, regulation and guidelines for the UK rail industry.	Comply with relevant standards and regulations.
	Risk assessment and hazard analysis identification, management and mitigation.	Identify and manage risk, and prepare contingency plans.
Contex	The context and scope of high speed rail in the UK and internationally, and its	

	integration into the wider transportation system.	
	The distinction and interface between conventional and high speed rail.	
	The role of specialist areas within conventional and high speed rail; civil engineering, track systems, traction and rolling stock, command, control and communication, power, digital and information operations, business management, systems engineering and integration.	Apply effective systems engineering practice, considering the interfaces between work packages and promoting and maintaining effective communications between disciplines.
	Appropriate fundamental engineering principles.	
Design	The relevance and importance of sustainability, environmental, social and economic considerations in the development and operation of a high speed railway.	Embed the principles of sustainability and environmental considerations into the design, development, installation and operation of high speed rail projects.
	How the rail network system is designed, built, installed, operated, maintained, renewed and decommissioned.	
	The impact of ergonomics and human factors on the design and operation of the railway.	
	The importance of forward thinking to future innovation, technology and ways of working.	Design and implement innovative solutions using new technologies to improve efficiency, cost effectiveness, customer service and safety to work-based problems.
Management	The requirements for, and characteristics of, leadership, collaboration and management	Demonstrate effective management, supervising and managing resources as appropriate.
	The principles of effective project management, stakeholder management and quality management.	a) Implement project management processes and tools to effectively manage work packages such as Gantt Charts, Logic Network, PERT Chart, Product and Work Breakdown Structure, Risk Register

		b) Work effectively with stakeholders c) Comply with quality assurance processes
	The principles of asset management.	Implement appropriate asset management tools to manage assets throughout their life cycle
	The importance of commercial awareness, including the relationship with the supply chain	
	The procurement process and its importance to the business and industry	
Information	The basics of working with Building Information Modelling (BIM) and the Common Data Environment.	Apply BIM and Asset Information Modelling (AIM) requirements effectively.
		Interpret and manage information, which could include multi-dimensional modelling, complex work plans, technical drawings and schematics, including change control.
Communication		Undertake and implement a high standard of technical work taking responsibility for efficient and effective delivery of work packages.
		Communicate effectively across all levels.
		Use appropriate IT systems and applications.

Behaviours – *The HSRI Advanced Technician;*

- Fosters a safe, secure and healthy working environment through personal responsibility and behaviour.
- Is customer focused and is dedicated to improving the customer experience.
- Effective self-manage, prioritise and a proactively approaches work and continuous professional development.
- Effectively lead.
- Acts professionally, shows commitment to the industry and employer, and is an effective ambassador for the employer.
- Is committed to equality, diversity and inclusion, and act ethically with integrity and respect.
- Works flexibly, embraces change, handles ambiguity and accepts new ideas and ways of working
- Uses effective communication skills to work collaboratively and to exchange constructive feedback.

Apprenticeship Options

Knowledge

The HSRI Civil Engineering Advanced Technician will know and understand;

- How to identify, eliminate and mitigate safety and health risks in the whole project lifecycle;
- The social and environmental factors arising from civil engineering activities;
- Legislation and standards regarding the design and construction of high speed rail systems;
- The civil engineering components, considerations, techniques, methods and software used in high speed rail;
- The interface between civil engineering, track and other network systems;
- The impact of structures, drainage, geotechnics and lineside equipment on the construction and durability of a high speed rail system;
- Procedures for gaining necessary planning consents;
- The necessity of designing, planning, coordinating and supervising temporary works;
- Processes for planning and delivering both on-site and off-site construction; how to effectively estimate, manage and control costs, resources and programme;
- Quality control and assurance, the link to productivity, and the application of lean principles and Business Improvement Techniques (BIT);
- The industry software used to achieve BIM requirements.

Skills

The HSRI Civil Engineering Advanced Technician will competently;

- Apply and influence safety and health principles in order to ensure a safe and healthy working environment;
- Implement processes that identify, eliminate, avoid and mitigate safety and health risks in design or construction;
- Comply with industry standards and legislation;
- Create, read, interpret and implement detailed plans and schedules;
- Contribute to the design, planning or implementation of high speed rail civil engineering projects, which could include lineside equipment, tunnels, cuttings, bridges, viaducts, or embankments;
- Contribute to the design, planning, implementation or decommissioning of temporary works;
- Estimate, manage and control costs, programme, risk and resources within area of responsibility;
- Effectively use industry software as appropriate to achieve BIM requirements;
- Establish dimensional control by surveying and setting out;
- Specify and select and manage a range of labour, plant and materials;
- Implement procedures that take account of structures, geotechnics and drainage for the construction, durability and safe operation of a high speed railway;
- Lead a team to efficiently manage a work package and achieve planned outcomes; apply processes for planning and delivery of both on-site and off-site construction.

Knowledge	**The HSRI Track Advanced Technician will know and understand;** • Health and safety regulations pertaining to track; • Identification, avoidance and mitigation of safety and health risks in design, construction, operation, maintenance and decommissioning; • The components of a track system, especially as applied to high speed rail; • The differences between conventional and high speed track and the interfaces between the two systems; • The essentials of constructing properly supported track bed; • The impact of alignment, hydrodynamics (chiefly drainage) and geotechnics on track; • Track geometry and the influence of speed; • Impact of assets and structures on the track system; • Processes associated with the planning, design, construction, monitoring, ongoing inspection, maintenance, renewal, repair and failure mechanisms of track; • Manufacturing and construction methodology behind track; • The range and use of specialist equipment and plant for track; • The necessity of designing, planning, coordinating and supervising temporary works; • Environmental impact of the whole track lifecycle.
Skills	**The HSRI Track Advanced Technician will competently;** • Engage in processes that identify, avoid and mitigate safety and health risks in design and construction; • Apply systematic safety and health practice during planned and unplanned activities across the whole track lifecycle; • Comply with legislation, processes and standards relating to the planning, design, construction, monitoring, maintenance, renewal, repair, manufacturing and construction methodology, disposal and environmental impact of track; • Contribute to the design, construction, monitoring, maintenance, renewal, repair and decommissioning of track; • Contribute to determining appropriate manufacturing and construction methodologies, including the decommissioning and environmental impact of track; • Produce and interpret detailed technical documents, including the application of BIM and other regulated information systems; • Account for the impact of alignments and geotechnics on track design, construction, maintenance and final system needs; • Contribute to testing and commissioning including integration with other systems.

Knowledge

The HSRI Systems Engineering Advanced Technician will know and understand;

- Processes to identify safety and health risk and their integration in an operational system;
- The concept, significance and meaning of systems thinking and the systems engineering discipline, and the impact of relevant standards;
- The necessity of taking a holistic approach to managing the lifecycle of a project from specification to decommissioning;
- Appropriate systems engineering approaches for different situations, types of assurance, validation and verification (from traditional 'V' model to Agile systems engineering);
- The necessity of designing, planning, coordinating and supervising temporary works;
- System architecture, hardware, software and interfaces;
- Available software and tools to support systems engineering, including BIM; requirements capture management theory and practical methods;
- Interface management theory and methods;
- RAMSS (Reliability, Availability, Maintainability, Safety, Security) analysis;
- Documentation hierarchy.

Skills

The HSRI Systems Engineering Advanced Technician will competently;

- Ensure safety and health risks are identified and captured;
- Identify and comply with relevant standards and regulations;
- Apply systems thinking to a broad range of challenges in the context of high speed rail;
- Identify system interfaces, contribute to interface management and communicate effectively across multiple disciplines and levels;
- Recognise different situations, plan systems engineering activities and apply systems engineering approaches;
- Identify project or system lifecycles and apply modelling principles to test system-level functionalities, interrelationships and scenarios;
- Select and apply appropriate system modelling techniques incorporating ergonomic and human factors;
- Contribute to the identification of testing, commissioning and hand-over requirements;
- Contribute to the capture, development, and management of requirements;
- Contribute to the development of systems architecture;
- Use available software and tools as appropriate, including the application of BIM;
- Estimate the production availability of a system by assessing failure modes, frequencies and consequences;
- Contribute to system analysis activities.

Knowledge

The HSRI Command, Control and Communications (CCC) Advanced Technician will know and understand;

- The design factors that embed health and safety into the CCC system;
- In-depth knowledge of Common Safety Method (CSM) and application of change within the CSM context;
- Risk and failure modes and how to build protection into the design;
- What is meant by CCC, and the differences between legacy, modern and future rail signalling and train control systems;
- Ergonomic and human factors relating to design and operation of a CCC system;
- Operation and maintenance requirements for CCC systems and how to demonstrate that they can be achieved;
- The commissioning certification process relating to the design, implementation and operation of a CCC system;
- IT hardware, software and technical architecture as appropriate;
- Security technology and systems including cyber security and levels of access;
- The function and operation of the European Rail Traffic Management System (ERTMS) including the European Train Control System (ETCS);
- Telecoms systems including the Global System for Mobile Communications – Railway (GSM-R) and subsequent evolutions to communicate between train and track-side;
- Purpose and processes for data management, configuration management and change management.

Skills

The HSRI CCC Advanced

Technician will competently;

- Fully comply with all safety guidance and regulations consistent with critical safety integrity levels;
- Assess risk and report failure modes and various scenarios in order to build protection into the design, including the application of ergonomics and human factors;
- Identify and describe modern systems for CCC as applicable to High Speed Rail;
- Identify and manage issues resulting from the interface between peripheral systems with modern digital and electronic CCC systems;
- Capture and manipulate survey and geographical data across all interfaces to inform design;
- Contribute to the selection, design, installation, maintenance, operation and decommissioning of CCC systems including within the CSM framework;
- Plan and implement monitoring, maintenance and repair of CCC systems; diagnose faults and implement solutions for a modern CCC system;
- Apply data, configuration and change management;
- Develop and apply security processes.

Knowledge	**The HSRI Rolling Stock Advanced Technician will know and understand;** • Health and safety standards, regulations and their application to high speed rolling stock; • Rolling stock systems, subsystems and components for high speed rail; • Factors that influence specific design considerations for high speed rail, including ergonomics and human factors; • Principles and application of train design including materials, energy sources, legislation and standards; • Current, future and alternative technologies impacting on the design and operation of high speed rail rolling stock; • The interaction between rolling stock and the track and aspects that may impact on stability and fatigue; • How noise and vibration is generated and methods of minimising impact between track and train; • The interface between the energy source and the train and electromagnetic compatibility; • Maintenance, vehicle examination and inspection processes, and related recording requirements; • Operational processes relating to in-service engineering and diagnostics; • Train care facility requirements to optimise train lifespan; • The potential impact of contractual commitments and penalties on the business and how this impacts on working practice.
Skills	**The HSRI Rolling Stock Advanced Technician will competently;** • Develop and maintain safety critical competencies, knowledge and behaviours; • Apply principles of product safety design and maintenance and safe working practice to include the impact of ergonomics and human factors; • Safely operate the rolling stock system and subsystem to be able to analyse and fault find; • Demonstrate the ability to interpret and apply legislation and standards as applied to rolling stock design, maintenance and operation; • Contribute to the design of systems, subsystems and components; • Use monitoring and inspection equipment to measure parameters of major rolling stock subsystems and components; • Effectively use diagnostic tools and methods to diagnose faults and defects in rolling stock and plan and implement solutions to maximise rolling stock use and ensure safe and operational service; • Dynamically risk assess non-routine work; • Accurately capture and maintain all necessary documentation, records and data analysis.

Knowledge	**The HSRI Power Advanced Technician will know and understand;** • Specific health and safety regulations and best practice while working with electrical power, emergency first aid for electrical hazards, safe working at height; • Electrical, electronic and mechanical engineering theories that underpin the field of power and distribution in the high speed rail context; • Industry standards that cover specific skills used for overhead lines, cable jointing and substation fitting activities; • Design of the electrification systems and components for a high speed rail system; • Power supply, transmission, protection and isolation devices for high speed rail; • Planning, installation and maintenance of OLE and related equipment; • The process of managing electrification from receipt from the National Grid transformers to use at track-side or Overhead Line Equipment (OLE); • The key roles of Electrical and Plant Distribution Engineers and Electrification Engineers; • Fault-finding techniques, common faults and repair procedures; • New technologies used on high speed rail in Britain and abroad.
Skills	**The HSRI Power Advanced Technician will competently;** • Consistently apply health and safety best practice and compliance, apply safe working at height and safety harness use and apply emergency first aid for electrical hazard; • Use and direct the use of lifting and access equipment • Safely, accurately and efficiently install and commission track-side and overhead power supply and transmission systems for high speed rail; • Erect and direct the erection of different types of overhead line structures, pre-fabrication and installation of main structure and small part steelwork and running wire systems • Take account of sectioning, insulation, registration and in-span components and the installation, enhancement and renewal of earthing and bonding • Plan, monitor, implement and maintain track-side and overhead line equipment using appropriate systems, standards, procedures and tools; • Conduct dynamic risk assessment for non-routine occurrences; • Read and interpret both paper-based and digital technical design drawings, models and schematics; • Effectively supervise teams and allocate work schedules; • Accurately complete and maintain necessary documentation.

Knowledge	**The HSRI Operations Advanced Technician will know and understand;** • Safety management for high speed rail operations; • The role of emergency planning and the function of responders; • Incident, accident, disaster and emergency management; • Cyber and other security threats to railway operations and mitigation factors; • The passenger market and management of revenue sources; • Importance of excellent customer service and the impact of quality assurance systems; • Procedures for delivering high speed passenger services; • Network management and operational management of timetabling and traffic management within high speed rail; • Principles of performance management.
Skills	**The HSRI Operations Advanced Technician will competently;** • Implement high speed railway standards, procedures and regulations to ensure effective, safe, secure and efficient operation; • Use historical and real-time data to accurately predict likely sources of incidents and make comprehensive plans for mitigation; • Implement appropriate training received in a response to an emergency situation; • Apply standard network code and operational code and interpret ERCO, ASSET and Ordnance Survey maps; • Implement tools and systems to effectively manage timetabling and high speed rail operations to ensure efficiency; • Apply performance management principles effectively; • Develop, implement and monitor policies and procedures designed to deliver excellent customer service and experience; demonstrate a commitment to outstanding customer service; • Interpret financial reports and manage revenue sources.

This is a level 4 apprenticeship.

Duration

The typical duration is 36 months, depending on prior learning and experience, with a minimum duration of 12 months.

Professional Recognition

This is a level 4 apprenticeship and it is designed to meet the requirements of the Engineering Council for registration as an Engineering Technician which can be awarded by relevant Professional Engineering Institutions licensed by them. It is however up to the individual and their employer whether they choose to register.

Entry requirements

Whilst any entry requirements will be a matter for the individual employer, typically an apprentice might be expected to have achieved a standard as demonstrated by A-Levels (one of which would typically be in Mathematics or Physics), a BTEC National Diploma in an appropriate vocational area (such as Engineering or the Built Environment), other Level 3 vocational qualifications, or other industrial experience. Apprentices without both level 2 English and Maths will need to achieve this level prior to taking the end-point assessment.

Review

This apprenticeship standard will be reviewed after 3 years.

Completion of the Apprenticeship is designed to be recognised by relevant Professional Engineering Institutions at the appropriate level of professional registration (EngTech).

Appendix two: High Speed Rail and Infrastructure Higher Technician - Core

Learning outcome	Assessment criteria
Knowledge;	The apprentice will be able to;
K1 The critical importance of safety and security in the conventional and the high speed railway industries, the principles of safe by design, system assurance, and health and safety legislation	• Analyse current legislation and guidance and their impact on the design, construction and operation of a railway • Understand the meaning of safety and be able to discuss the critical importance of safety considerations on the railway • Detail safety-related processes and tools used on the railway • Explain the implications of various incidents that may happen on a railway network and how these are responded to • Explain the importance of learning from previous experience to ensure constant reduction of risk factors
K2 The relationships of health and welfare strategies with safety in the workplace	• Explain what is meant by a safety culture and how this is embedded into work practices • Explain the meaning of health and welfare and analyse their implications for safety on the railway • Detail legislation pertaining to working hours and employee welfare and discuss the implications of these for a modern railway • Discuss the relationship between implementing health and welfare policies and the efficient and safe running of a railway system
K3 The relevance of standards, policy, regulation and guidelines for the UK rail industry.	• Demonstrate a detailed awareness of legislation, guidance and best practice relating to health and safety on the railway network
K4 Risk assessment and hazard analysis identification, management and mitigation.	• Discuss the role of risk assessment within project management • Describe risk assessment tools and how they are used for the development and operation of a modern railway • Describe how risks are identified, monitored and mitigated against • Describe hazard analysis as the process of recognizing hazards that may arise from a system or environment

K5 The context and scope of high speed rail in the UK and internationally, and its integration into the wider transportation system.	• Discuss key events in the history of the UK rail industry and explain how they influence the railway network today and in the future • Identify key stakeholders in the UK rail industry and describe their roles • Discuss the funding streams for the UK rail industry and the roles of the key funding stakeholders • Describe how funding for British railways is allocated and the role of the franchise and open access systems • Identify the current proposal for high speed routes in the UK and how they connect with the conventional network and the wider transport system • Compare the development of high speed rail internationally with the UK • Discuss the significance of high speed rail networks internationally and in the UK • Articulate the different interpretations of high speed rail across the world and examine the characteristics of high speed travel • Discuss the economic, business and social case for high speed rail

K6 The distinction and interface between conventional and high speed rail.	Identify and describe the key differences between high speed and conventional rail that impact on the design, construction and operation of a high speed rail network. • Aerodynamics considerations; drag, tympanic safety, air tightness, structural fatigue, sonic boom, crosswinds, slip-stream effect • Fire protection; long tunnels, must have at least 15 minutes running time • Running dynamics; safety, instability control, bogie monitoring, dynamic comfort, vehicle/track interface, wheel/track wear • Noise; inside the train and outside for communities • Traction; high power in low weight, energy regeneration, high brake power, track adhesion, start acceleration, residual acceleration, redundancy and ramps (spare power to ensure continuity of service) • Passenger service and expectations; seating, interior

	design and style, on-board equipment – passenger information, entertainment etc., accessibility • Cost; technical, research and development, customer
K7 The role of specialist areas within conventional and high speed rail; civil engineering, track systems, traction and rolling stock, command, control and communication, power, digital and information operations, business management, systems engineering and integration.	• Have an overview of the purpose and roles of various specialist sectors in the development and operation of a high speed railway • Explain the interconnections between the specialisms • Understand the key interfaces such as power networks, communities and other transport systems • Explain the importance of clear communication routes between professionals from different areas for the efficient and safe development and operation of a railway system
K8 Appropriate fundamental engineering principles.	Engineering principles; • Describe how engineering principles are applied to tasks • Describe the basic properties of materials and their interaction

	• Describe the engineering lifecycle – design, development, commissioning, manufacture, construction, operation and maintenance of products, equipment, processes, systems or services Engineering maths • Understand how geometry and trigonometry principles are applied • Explain basic calculus and describe how equations are applied to technical problems • Understand how areas and volumes are calculated and their application in the development of the railway Engineering science • Explain physics theories and how they apply to engineering problems • Explain electrical and electronic engineering theories that underpin the field of power and distribution • Describe metallurgical principles and how they impact railway design, operation and maintenance

K9 The concept of sustainability, environmental, social and economic considerations	• Explain the Government's rationale and policy relating to developing high speed rail in the UK • Describe the legislative process for approving a major high speed rail infrastructure project • Analyse the impact of Government policy on national and regional economic development • Discuss the role of local government and stakeholder organisations in the planning and construction of a major infrastructure project • Outline the planning process for a major infrastructure project • Analyse the impact of the consultation process and public relations role • Describe potential social considerations on communities of the development of high speed rail • Discuss the meaning of social sustainability and its significance for railway projects • Explain how potential negative impacts on society can be mitigated against and balanced against positive impacts • Discuss key considerations related to the environment with examples of decisions on railway engineering projects • Discuss ecological issues surrounding the building and operation of a high speed railway system • Explain the concept of economic sustainability and its role in major railway projects • Explain the principle of the circular economy in relation to sustainability • Analyse potential national and regional economic considerations of the development of high speed rail
K10 How the rail network system is designed, built, installed, operated, maintained, renewed and decommissioned.	• The interaction between the client, user and supplier • Impact of stakeholders on design; government; public; local politicians; passenger groups; project planner • Describe the logical steps used in creating functional products and processes • Establish design requirements and links to feasibility analysis

	• Explain the design requirements control process throughout a project including the use of appropriate software and hardware • Describe the design process from conception to production planning
K11 The impact of ergonomics and human factors on the design and operation of the railway.	• Explain definitions of human factors and ergonomics • Analyse the implications of human factors and ergonomics for safety and operation of the railway

K12 The importance of forward thinking to future innovation, technology and ways of working.	• Understand the core purpose of embedding digital technologies into a modern railway
	• Understand the application and impact of digital technologies to the field of;
	  ○ safety for the operator and passenger
	  ○ communications including signalling, telecoms, data management and centralised control systems
	  ○ security, particularly with regard to cyber security and hacking
	• Explain how new technologies are improving the customer experience
	• Discuss how new technologies are impacting on working practices on

	a railway including station management, command, control and communications and the collection and use of data • Discuss potential future technologies and how they might impact on the development and operation of a railway
K13 The requirements for, and characteristics of, leadership, collaboration and management	• Define what effective human resource management entails and the skills required to achieve it • Understand the concept of human resource planning • Understand different leadership styles, how to lead multiple and remote teams and manage team leaders. • Know how to motivate and improve performance, supporting people using coaching and mentoring approaches. • Understand organisational cultures and diversity and their impact on leading and managing change. • Know how to delegate effectively • Know how to manage multiple teams, and develop high performing teams. • Understand performance management techniques, talent

	management models and how to recruit and develop people. • Understand approaches to partner, stakeholder and supplier relationship management including negotiation, influencing, and effective networking. • Demonstrate knowledge of collaborative working techniques to enable delivery through others and how to share best practice. • Know how to manage conflict at all levels and describe the importance of employee relations to a successful business. • Understand interpersonal skills and different forms of communication and techniques (verbal, written, non-verbal, digital) and how to apply them appropriately.
K14 The principles of effective project management, stakeholder management and quality management.	• Know how to set up and manage a project using relevant tools and techniques, and understand process management. • Understand approaches to risk management. • Discuss the role of project management in railway projects such as HS2

	• Critique successful and failed projects • Describe the main process groups on project management and identify their place in the project lifecycle • Describe project management tools and software and describe how and why they might be used • Describe what is meant by stakeholder management • Describe why stakeholder management is a critical component to the successful delivery of any project, programme or activity. • Define a stakeholder as any individual, group or organization that can affect, be affected by, or perceive itself to be affected by a programme. • Define the 10 key principles of effective stakeholder management • Explain how effective quality management ensures that an organization, product or service is consistent. • List and describe the four main components of quality

	management: quality planning, quality assurance, quality control and quality improvement. • Explain how quality management is focused not only on product and service quality, but also on the means to achieve it.
K15 The principles of asset management.	• The role of asset management in ensuring actions across the organisation are consistent with the organisation's vision and values • The definitions of performance, reliability, availability, safety and security (PRAMMS) • The processes related to PRAMMS and describe how they are used in the context of high speed rail with simple examples • PRAMSS throughout the lifecycle of a project • How risks identified by the business are managed and the calculation of risk versus benefit • Asset management systems, processes and procedures that deliver the required level of

	PRAMMS taking account of risk, performance and value • The management of the principles of risk, performance and value to ensure whole life value for money
K16 The importance of commercial awareness, including the relationship with the supply chain	• Understand commercial awareness as referring to a general knowledge of the business, and an understanding of the industry in which it operates • Explain how business activity impacts on customers, competitors and suppliers. • Explain the economics of the business and understand the business benefits and commercial realities from both the organisation's and the customer's perspectives. • Explain the need for efficiency, cost-effectiveness, customer care and a knowledge of the market place in which the company operates (current economic climate and major competitors, for example) • Describe the process of managing a supply chain and the impact on the business of ineffective management

	• Explain how supply chain performance is monitored and managed
K17 The procurement process and its importance to the business and industry	• Understand the procurement as the act of finding, acquiring, buying goods, services or works from an external source. • Describe the tendering or competitive bidding process and explain how the process is used to ensure the buyer receives goods, services or works at the best possible price, when aspects such as quality, quantity, time, and location are compared. • Explain how procurement processes promote fair and open competition for their business while minimizing risk, such as exposure to fraud and collusion.
K18 The basics of working with Building Information Modelling (BIM) and the Common Data Environment.	• Describe Building Information Modelling (BIM) is a broad term that describes the process of creating and managing digital information about a built asset such as building, bridge, highway etc. • Describe the impact of the Government Construction Strategy on centrally-procured public projects

	• Describe the protocols such as the Construction Industry Council (CIC) BIM protocol • Explain the common data environment (CDE) and how it is used to collect, manage and disseminate documentation, the graphical model and non-graphical data for the whole project team that leads to an integrated design and facilitates collaboration and prevents conflict between project team members and helps avoid duplication and mistakes. • Explain the role of the information manager as a procedural gate-keeper, policing the common data environment to ensure that it follows the agreed protocol and that the data is secure • Describe the range of software and equipment used to manage the BIM process
Skills	The apprentice will be able to;
S1 d) Develop and maintain an	g) Demonstrate and maintain a safety culture and show how it can be embedded into work practices

effective safety culture. e) Embed a culture of health, welfare and safety compliance to ensure the health and safety of employees, customers, visitors and members of the public. f) Rigorously apply security procedures.	h) Conduct health and welfare and analyse and show its impact on safety on the railway i) Demonstrate how legislation pertaining to working hours and employee welfare can be effectively implemented on a modern railway j) Demonstrate a detailed awareness of legislation, guidance and best practice relating to health and safety on the railway network
S2 c) Apply rigorous health and safety practices, comply with legislation and safety processes. d) Design safety into all aspects of the rail network, accounting for end-user requirements.	• Apply current legislation and guidance and their impact on the design, construction and operation of a railway • Detail safety-related processes and tools used on the railway • Review various incidents that may happen on a railway network and demonstrate how these are responded to • Learn from previous experience to ensure constant reduction of risk factors • Apply current legislation and guidance on the design,

	construction and operation of a railway • Rigorously apply safety-related processes and tools used on the railway
S3 Comply with relevant standards and regulations.	• Implement standards and regulations across the railway
S4 Identify and manage risk, and prepare contingency plans.	• Documenting the unwanted consequences of hazards and analyse their potential causes • Effectively implement risk assessment within project management • Use risk assessment tools for the development and operation of a modern railway • Demonstrate how risks are identified, monitored and mitigated against • Conduct hazard analysis as the process of recognizing hazards that may arise from a system or environment
S5 Apply effective systems engineering practice, considering	• Demonstrate an understanding of an overview of systems engineering and the interconnections and

the interfaces between work packages and promoting and maintaining effective communications between disciplines.	interfaces between various specialisms and disciplines • Apply different systems engineering approaches for different situations • Promote effective communications between different disciplines and specialisms • Identify systems interfaces • Apply systems modelling principles to test system-level functionality, relationship and scenario
S6 Contribute to embedding the principles of sustainability and environmental considerations into the design, development, installation and operation of high speed rail projects.	• Embed policies relating to environmental protection and sustainability in working practice • Recognise social sustainability in working practice • Recognise ecological issues surrounding the building and operation of a high speed railway system • Embed the concept of economic sustainability and its role in major railway projects
S7 Design and implement innovative solutions to work-based problems.	• Use new technologies appropriately in working practice to improve efficiency, cost effectiveness, customer service and safety

	• Collaborate to develop and implement innovative solutions to business or technical problems
S8 Demonstrate effective management, supervising and managing resources as appropriate.	• Effectively demonstrate appropriate leadership styles to lead multiple and remote teams and manage team leaders. • Motivate staff to improve performance using coaching and mentoring approaches. • Take account of organisational cultures and diversity when leading and managing change. • Delegate tasks, responsibilities and resources effectively • Work effectively with partners, stakeholders and suppliers and manage relationships including negotiation, influencing, and effective networking. • Demonstrate collaborative working techniques to enable delivery through others and share best practice. • Manage conflict at all levels and demonstrate effective employee relations • Manage business finances and resources effectively within context of job role

S9 d) Implement project management processes and tools to effectively manage work packages such as Gantt Charts, Logic Network, PERT Chart, Product and Work Breakdown Structure, Risk Register e) Work effectively with stakeholders f) Comply with quality assurance processes	• Manage projects using relevant tools and techniques, and understand process management. • Manage risk appropriately and according to company procedure • Utilise project management tools and software • Implement appropriate stakeholder management activity to the benefit of the business • Implement effective quality management to ensure that an organization, product or service is consistent
S10 Implement appropriate asset management tools to manage assets throughout their life cycle	• Apply asset management processes and procedures that deliver the required level of PRAMSS taking account of risk, performance and value. • Employ tools and processes which can be used to improve PRAMSS on the railway, including hazard identification and analysis (HAZID), Failure, Mode, Effects and Criticality Analysis (FMECA), failure mode calculation, failure rate calculation, PRAMSS modelling. • Apply key principles of risk, performance and value and their management to ensure whole life value for money (WLfFM)
S11 Apply BIM and Asset Information Modelling (AIM) requirements effectively.	• Work collaboratively and manage information exchange across multiple disciplines enabling integration of information by the project team and co-ordination of information by lead designer • Apply government guidelines accurately and consistently • Establish a common data environment (CDE), along with its processes and security and ensure integrity • Establish the information structure and standards for the information model, agreeing output formats and validating compliance

	• Assist project teams to establish information exchange processes • Manage the disseminate documents accounting for document status, version control, revision control and approval process • Use cloud tools that are relevant to the project and client • Apply principles of BIM protocols and comply with contractual and legal requirements
S12 Interpret and manage information, which could include multi-dimensional modelling, complex work plans, technical drawings and schematics, including change control.	• Interpret and manage information and data presented in a range of formats including; ○ Spreadsheets ○ Graphic presentations ○ Technical drawings ○ 2D and 3D CAD presentations ○ Schematics
S13 Undertake and implement a high standard of technical work taking responsibility for efficient and effective	• Produce work to required standard, within budget and timeframes expected • Comply with quality assurance processes • Take responsibility for own performance within job role

delivery of work packages.	
S14 Communicate effectively across all levels.	• Use appropriate methods of communication according to the situation and audience • Demonstrate awareness of non-verbal communication • Prepare and deliver presentation, presenting ideas and information clearly and effectively • Create appropriate written communications including letters, e-mails and reports • Use appropriate verbal communication skills according to the situation and audience 5.
S15 Use appropriate IT systems and applications.	• Effectively apply a range IT packages to effectively deliver workpackages including; Word, Excel, Powerpoint, internet, databases

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