TECHNICAL APPRENTICESHIP IN ENGINEERING & DIGITAL MANUFACTURING

ℹ This Apprenticeship is for

This apprenticeship is designed to support the development of apprentices working in the Engineering sector in roles such as Technician, Industrial Technician, Engineering Technician, Industrial Engineer, Lead Engineer and Production Engineer, and across fields such as Additive Manufacturing, Advanced Manufacturing, Digital Manufacture, Design Engineering, Electrical and Electronic Engineering, Manufacturing, Mechanical Engineering, Metrology, and Welding. The goal of the apprenticeship is to develop competence in the use of existing, evolving and emerging technologies and to enable apprentices to apply advanced engineering practice and principles in supporting and making engineering and manufacturing decisions.

🕒 Duration

This apprenticeship is expected to last around 48 months.

📊 Level

SCQF Level 8. More information on SCQF can be found here.

🏅 Qualification(s) Achieved

- Diploma in Engineering & Digital Manufacturing at SCQF Level 8 (R709 04);

- and either an HNC at SCQF level 7 or an HND at SCQF level 8 in an engineering discipline relevant to the job role

INTRODUCTION

Apprenticeships aim to provide a mixture of on-the-job (in the workplace) and off-the-job (through day or block release) learning to enable people to develop the knowledge, skills and expertise required by businesses today.

Designed by employers to attract new talent, tackle critical skills shortages and develop existing workforces, apprenticeships can both help people to enter the world of work and develop the skills of those already in work

About Scottish Apprenticeships

Scottish Apprenticeships are funded by the Scottish Government and reflect the Government's commitment to promoting a world-class, inclusive, work-based learning system; they are administered by Skills Development Scotland, the national skills agency. Skills Development Scotland has a remit to contribute to the nation's economic growth and it does this by supporting individuals and businesses alike to develop and apply their skills in the workplace.

The Scottish Apprenticeships system focuses on three key elements:

- the **learning outcomes** aligned to the specific functions of an apprentice's job;

- the **knowledge, skills and behaviours** that will be developed by apprentices, enabling them to work competently and confidently; and

- the **meta-skills** that will be developed by apprentices to help them to manage themselves, collaborate with others and interact with change.

Throughout their apprenticeship, apprentices will be supported and guided by their employer, mentor and learning provider, and will have their growing competence measured by an assessor to ensure they can perform their job to the standard required. On successful completion, apprentices will be awarded nationally recognised competence-based and/or professional qualifications in their chosen field.

About this apprenticeship

Working in partnership with businesses and stakeholders, this standard apprenticeship document has been written to provide apprentices and employers with an overview of the key features of this apprenticeship. Please read this alongside the associated occupation profile.

Interested in other types of apprenticeship? Find further information here.

THE ROLE OF THE APPRENTICE

This apprenticeship is designed to support technician level roles in Engineering and Digital Manufacturing across a range of fields including Additive Manufacturing, Advanced Manufacturing, Digital Manufacture, Design Engineering, Electrical and Electronic Engineering, Manufacturing, Mechanical Engineering, Metrology, and Welding.

There are a number of roles available at this level, such as Technician, Industrial Technician, Engineering Technician, Industrial Engineer, Lead Engineer and Production Engineer. All of these roles require employees to deal with stakeholders (both internal and external), apply technical knowledge and skills across a range of work situations, and demonstrate a clear understanding of regulatory and legislative frameworks as well as the requirements of their own role and the goals of the organisation.

Apprentices will be expected to achieve the following **learning outcomes** by the end of their apprenticeship;

- Provide engineering process support in line with safe systems of work and standard operating procedures

- Provide day to day engineering maintenance support in line with safe systems of work and standard operating procedures.

- Interpret design and construction requirements and create the processes to build to meet specifications and quality requirements and in line with safe systems of work and standard operating procedures.

- Inspect and test products, systems, or components meet safety, quality, functional and organisational requirements.

- Locate, diagnose, resolve, and rectify faults using problem solving techniques, diagnostic software, and tools in line with safe systems of work.

- Apply approved industry quality control and assurance processes to support the delivery of products and/or services to meet safety and regulatory requirements.

- Use project management tools to plan, organise, manage resources, risk, safety, and monitor progress to achieve quality performance indicators.

- Support the development of new or revised products by providing design-led solutions to problems in line with safe systems of work and standard operating procedures.

- Understand how new technologies and net zero targets will impact manufacturing, including the integration of new or modified automation, digital systems, and manufacturing engineering systems.

- Manage and improve own performance in a business environment and in line with organisational requirements.

- Organise and facilitate meetings to achieve objectives in line with organisational requirements.

- Create and maintain positive working relationships with stakeholders to enable their expectations to be met in line with organisational requirements.

- Interpret, review and complete documentation to ensure accuracy, accountability, and traceability in line with organisational and regulatory requirements.

DEFINING KNOWLEDGE, SKILLS AND BEHAVIOURS

This apprenticeship is designed to develop apprentices' careers by developing their knowledge and understanding of their role, by increasing their skills and by enhancing their behaviours.

Employers from across the engineering and manufacturing sector have helped to identify the key knowledge, skills and behaviours that technician apprentices need to develop. Throughout their apprenticeship, apprentices should be regularly assessed to ensure they can demonstrate both know-how and ability in each of these areas, a high-level summary is provided below. A full list of the knowledge, skills and behaviours can be found in the associated occupation profile.

Knowledge

- engineering principles
- project management
- legislation and codes of practice
- safe systems of work
- risk and impact assessment for engineering activities
- impact of new technologies and net zero targets on engineering and manufacturing
- costing of engineering activities
- quality control, assurance and improvement processes

Skills

- data analysis and problem solving
- communication and collaboration
- technical report writing
- use of engineering software
- inspection and testing
- diagnosing and resolving faults
- design
- planning and scheduling

Behaviours

- initiative and leadership
- integrity
- adaptability and resilience
- innovation
- strong client focus

DEFINING META-SKILLS

Meta-skills sit alongside and complement technical knowledge, skills and behaviours. As technology, society and the way we work change at an ever-increasing pace, so meta-skills are the over-arching and future-focused attributes that enable other skills to be developed through consideration, reflection and implementation.

Meta-skills support improved performance and productivity, greater adaptability and resilience to change. For apprentices, meta-skills are a critical asset, supporting their ability to cope and excel in the face of change, to solve problems, to collaborate with others and to create successful futures. There are three categories, each with four meta-skills.

Managing yourself – focus, integrity, adaptability and initiative
Connecting with others – communication, feeling, collaboration and leadership
Interacting with change – curiosity, creativity, sense-making and critical thinking

Developing 12 Meta-skills in Engineering & Digital Manufacturing

Supported by their employer, mentor and learning provider, apprentices will consider, practise and reflect on their use of meta-skills during their apprenticeship, building those skills to enhance their personal effectiveness in their present role and their future careers.

Managing Yourself

A clear **focus** is required to work carefully and correctly and to avoid distraction, it's essential for complex tasks, and critical when using dangerous equipment or machinery; **integrity**, being honest and trustworthy, is essential for open and honest analysis of failures, or when challenging an issue with colleagues or managers; **adaptability** is key when responding to changes in technology and processes; and using **initiative** is critical when faced with unclear instructions or when colleagues are unavailable.

Connecting with Others

Clear and concise **communication** is key when circumstances are changing – either for customers or for co-workers; **feeling** is needed to create awareness of the emotions of both yourself and others and helps in adapting or responding to new situations or surroundings; **collaboration**, working effectively with colleagues to get a job done to standard and on time is vital for complex tasks or when faced with technical problems; and strong **leadership** qualities are developed through helping and directing newer colleagues or apprentices.

Interacting with Change

A keen sense of **curiosity** is a critical asset when learning new things and learning better ways of doing things; **creativity** is fundamental when producing solutions to new problems or developing new products or processes; **sense-making** comes into play when interpreting complex instructions or technical drawings and breaking down tasks into simpler, manageable steps; and **critical thinking** is key when coming up with solutions when fault finding.

KEY ROLES AND RESPONSIBILITIES

A number of different parties will be involved in the delivery, management and assessment of a successful apprenticeship. As well as the apprentice, key roles include employer, mentor, learning provider and assessor. Each has a specific set of responsibilities during the apprenticeship.

Apprentice Responsibilities

In their day-to-day roles, apprentices have the same responsibilities to their employer as any other employee but they have additional and specific responsibilities for their own learning and development too.

- Agreeing a learning and development plan with all parties involved and following it through
- Committing to learning throughout the duration of apprenticeship
- Participating in progress meetings with employer and learning provider
- Participating in off-the-job learning where required
- Reflecting on performance and on development of skills, knowledge and behaviours required of the role
- Agreeing new goals to progress learning with all parties involved

Employer Responsibilites

- Providing apprentices with a contract of employment, a job description and an induction programme
- Paying apprentices in line with company policy, current legislation, fair work principles, and equality and diversity expectations
- Ensuring a working environment that is free from discrimination, bullying and harassment

- Agreeing learning needs and learning and development plan with learning provider and apprentices including:
  - agreeing when off-the-job learning will be required and releasing apprentices for this as required
  - making on the job learning arrangements
  - identifying additional support requirements and agreeing actions to implement this
- Providing a quality work-based learning environment for apprentices, including the facilities and training necessary to demonstrate competence and succeed in the apprenticeship
- Providing the support of a mentor who has relevant industry experience and is familiar with the employer's business to support apprentices' development
- Contributing to the ongoing assessment of occupational competence, including observing performance, verifying evidence and profiling meta-skills
- Meeting with apprentices and learning providers to review apprentices' progress and set future goals
- Providing an environment that supports apprentices to take responsibility for their own learning and development
- Supporting and encouraging apprentices during their apprenticeship
- Recognising the achievements of apprentices in career management and progression
- Providing constructive feedback to the learning provider on the quality of their service delivery to inform continuous improvement of both the Scottish Apprenticeships system and apprentices themselves

KEY ROLES AND RESPONSIBILITIES

Mentor Responsibilities

- Helping new apprentices orientate into the workplace
- Providing information, advice and guidance relating to the learning and assessment aspects of the apprenticeship
- Supporting apprentices to define meta-skills in their shared work context
- Working with apprentices, employers and learning providers to ensure problems are resolved quickly
- Acting as an expert witness for apprentices
- Providing support to apprentices as they adjust to the workplace and progress in their career

Learning Provider Responsibilites

- Providing an appropriate apprenticeship programme for apprentices and employers
- Agreeing the learning needs of the apprentices with both the apprentice and the employer
- Agreeing when off-the-job learning will be required and defining roles and responsibilities for this with relevant parties
- Ensuring apprentices have access to the best quality learning opportunities available
- Ensuring apprentices and employers fully understand the principles and processes of competence-based assessment
- Registering apprentices through MA Online and with relevant awarding bodies, Sector Skills Organisations and Skills Development Scotland as appropriate

- Compiling and agreeing learning and assessment plans with apprentices and employers
- Completing assessment records and submitting records and evidence for verification/moderation
- Reviewing apprentices' progress at regular intervals with the employer
- Supporting apprentices to develop their reflective practice
- Advising apprentices who to approach for support, advice and encouragement both within and outwith the workplace
- Seeking and providing feedback from and to employers and apprentices to inform continuous improvement of the Scottish Apprenticeships system and apprentices themselves

Assessor Responsibilites

- Meeting with apprentices, mentors and employers to plan learning and review progress
- Monitoring apprentices' progress against learning and development plans
- Observing and assessing apprentices in the workplace and judging whether their work meets the competence requirements required by the qualification awarding body
- Assessing different types of evidence from apprentices
- Providing constructive feedback on performance and offering suggestions for improvement
- Maintaining current knowledge of industry standards and seeking innovative new methods of work-based learning delivery

The recruitment of apprentices is primarily the responsibility of the employer and before an apprenticeship starts, consideration by the employer should be given to entry requirements and also to ensuring that the workplace adheres to fair work, inclusion and diversity principles.

There are no formal entry requirements for this apprenticeship, but it is recommended that applicants have either completed a modern apprenticeship in Engineering; or hold 2 or more SQA Highers, and Mathematics at National 5 or above; or hold a National Certificate (SCQF level 6) or a Higher National Certificate (SCQF level 7) qualification in Engineering.

However, employers can also consider existing workplace skills and experiences, where apprentices are either changing careers or upskilling. Being open to alternative assessment methods and relevant experience, instead of qualifications, can help to broaden the pool of potential applicants.

Recognition of Prior Learning (RPL)

Individuals applying for an apprenticeship will undergo a selection process based on the employer's existing HR practices. Learning providers should take account of this and also liaise with employers to provide advice and guidance on any RPL and experience that will be accepted for entry onto the apprenticeship.

It is recommended that a flexible approach to RPL is adopted, on a case-by-case basis, with all relevant experience as well as any previous qualifications taken into account. In particular, learning providers should always consider how they can best recognise apprentices' prior learning in order to minimise repetition of learning. You can find more information on RPL here.

Fair Work, Inclusion and Diversity

The Scottish Apprenticeships system aims to embed fair work principles. Fair Work First is the Scottish Government's flagship policy for driving high quality and fair work across the labour market in Scotland by applying fair work criteria to grants, other funding and contracts being awarded by and across the public sector, where it is relevant to do so. Through this approach the Scottish Government is asking employers to adopt fair working practices, specifically:

- appropriate channels for effective voice, such as trade union recognition;
- investment in workforce development;
- no inappropriate use of zero hours contracts;
- action to tackle the gender pay gap and create a more diverse and inclusive workplace; and
- payment of the real Living Wage.

Further guidance on Fair Work First is available from https://www.gov.scot/publications/fair-work-first-guidance-support-implementation/

The design and development of Scottish Apprenticeships aims to embed these principles in practical ways by including opportunities for feedback from apprentices as well as the availability of clear pathways into future opportunities beyond the apprenticeship itself.

Protected characteristics

The Equality Act 2010 includes nine protected characteristics, which are age, disability, gender reassignment, marriage and civil partnership, pregnancy and maternity, race, religion or belief, and sex and sexual orientation. It is against the law to discriminate based on these protected characteristics. Skills Development Scotland is a Corporate Parent and, to that end, includes 'care experienced' in a similar way to protected characteristics in all our funded programmes and services.

Attracting the best people into apprenticeships involves ensuring that barriers are removed. Receiving the right support at the right time unlocks the potential of people who could otherwise be denied the opportunity to go on and become valued employees. Supporting people to feel confident about disclosing their protected characteristics in a safe and respectful way allows employers and learning providers to put the right conditions in place to unlock that potential; the right time for this is often at the start of an apprenticeship or even at the recruitment stage. In practice, it might involve ensuring that reasonable adjustments are made to accommodate apprentices, where that is possible and in order to help them make the most of their apprenticeship journey. Examples might include (but are not limited to) supporting people with sensory impairments, supporting people for whom English is not their first language and supporting people who are care experienced (for example, through fostering, adoption or residential care).

Diversity in Engineering & Digital Manufacturing

Evidence shows that women tend to be under-represented within the Engineering and Manufacturing sector, although this can vary by job role. We also know that some groups are more likely to face barriers to employment, for example, disabled people, care experienced people, people from ethnic minority groups, and/or people with caring responsibilities. Recruitment and delivery of this framework should take into account the need to be flexible and adapt to support the different needs of learners.

Apprenticeship Agreement and Employment Status

All post-school apprentices must hold a contract of employment for the period of the apprenticeship. In addition, an apprenticeship agreement, confirming the commitment of the employer, the apprentice and the learning provider to the agreed standard and framework (this document) must be signed by all parties. This agreement forms part of the individual employment arrangements between the apprentice and the employer, and of the learning arrangements between the learning provider, the employer and the apprentice.

Registration and Certification

Registration and certification of apprenticeships is undertaken through Modern Apprenticeship Online. It is the responsibility of the learning provider to ensure that the registration of apprentices is completed within four weeks of the start of their apprenticeship.

Once the apprenticeship starts, there are a number of key considerations, tasks and milestones that apprentices, employers, learning providers, mentors and assessors should undertake to optimise a successful outcome for all parties.

Work-based Learning

Work-based learning – aligned to and assessed against both the learning outcomes and the knowledge, skills and behaviours of the apprenticeship – is the central and most significant component of an apprenticeship and is based on apprentices' real-life experiences in the workplace. Work-based learning is a partnership between apprentice, employer and learning provider and all apprentices must have the support of a mentor in the workshop.

Get more information on work-based learning **here.**

Meta-skills Development

This apprenticeship includes a **learning outcome** that provides opportunities to develop **meta-skills**. To effectively develop the 12 meta-skills outlined earlier, apprentices must first understand what they are and how they might apply them in their role. To help with this, a simple exercise to define what the 12 meta-skills mean in their role (in language that both apprentice and employer are comfortable with) should be used. This will allow apprentices to consider their own meta-skills profile and which meta-skills they might need to develop or apply in order to perform effectively at work.

Setting development goals, action planning and regularly reflecting on progress will help apprentices to develop their meta-skills and it is vital to provide the time and space for reflections to take place. Naturally occurring opportunities to discuss and reflect on meta-skills might include inductions or performance management, career development and performance review sessions.

Delivery of Training

Consultation indicated that learning for this apprenticeship should take place primarily within the workplace by aligning work activities to the apprenticeship outcomes. At the same time, off-the-job learning should also be provided to enable the apprentice to achieve a relevant Higher National Certificate or Diploma qualification (unless the apprentice already holds this qualification).

A learning and development plan and an assessment plan should be developed to align work activities with the apprenticeship outcomes and to identify naturally occurring opportunities to gather evidence for assessment. The learning and development plan should also identify any additional needs and provide apprentices with the appropriate support or adaptations required to successfully complete their apprenticeship.

Approaches to Assessment

Apprentices are expected to provide evidence of meeting the **learning outcomes** and the **knowledge, skills and behaviours** required of this apprenticeship; also, evidence to demonstrate that they are competent in the workplace. It is important for apprentices to recognise how they have developed skills and understanding along the way, and where these still need to be developed.

Observation, questioning and examination of product evidence
This three-method approach classifies all assessments under observation, questioning and examination of product evidence. It is therefore based on the development of a **portfolio of work** and **regular reflection** on learning and skills development through professional dialogue between apprentices and mentors, employers and learning providers.

Holistic Assessment

The holistic approach allows larger pieces of work to evidence a number of **learning outcomes,** rather than a piecemeal process of finding separate evidence for each outcome and/or its associated **knowledge, skills and behaviours. Work-based projects** or **problem-based activities** often provide the richest opportunities for holistic assessment.

Quality Assurance

Skills Development Scotland is responsible for making sure all funded learning is of high quality and benefits the apprentice. A quality assurance framework is in place to cover the delivery of work-based learning in an apprenticeship and is designed to demonstrate how effectively learning providers and employers support this by ensuring that apprentices:

- receive appropriate support and guidance to enable them to become successful apprentices and confident individuals;

- receive quality training and develop their skills to achieve their learning goals;
- are treated with dignity and respect in a way that promotes equality and inclusion; and
- work towards successful outcomes, leading to future employment or further appropriate career progression.

The relevant awarding and accreditation bodies will undertake the quality assurance of the assessment of competence-based and professional qualifications.

Qualification Requirements

Apprentices should attain **both**:

- **the Diploma in Engineering and Digital Manufacturing at SCQF Level 8 (R709 04)**
  Through their apprenticeship, apprentices must complete this competence-based qualification which brings together the development and assessment of all the learning outcomes and knowledge, skills and behaviours required of the role in a single qualification. This qualification integrates the development and assessment of meta-skills with technical skills
- **and a Higher National Qualification**
  In addition to attaining the above noted competence-based qualification, apprentices should attain, unless already held, a Higher National Qualification in an engineering discipline that is relevant to their job role. This can be either a Higher National Certificate at SCQF Level 7, or a Higher National Diploma at SCQF Level 8 as deemed most appropriate by the employer and apprentice to support in the work role and for further progression.

Pathways and Progression

A successfully completed apprenticeship, including the achievement of competence-based and professional qualifications, opens the door to a number of opportunities for progression in both work and further learning.

Career advancement
Successful apprentices may progress within the workplace to either technical specialist roles or supervisory/managerial roles.

Further study
Options for those wishing to pursue further professional learning and development include degree level study in Engineering or in business related subjects. In particular, this Technical Apprenticeship supports progression with advanced standing to the Graduate Apprenticeship in Engineering Design and Manufacture.

Professional Registration

This apprenticeship may support professional recognition as it includes learning and skills outcomes common to a number of the introductory professional qualifications relevant to the **Engineering and Digital Manufacturing** sector. The apprentice, employer and learning provider will determine the most appropriate professional pathway in light of the apprentice's specific work role and the learning provider will guide each successful apprentice on the professional registration process they should follow.

AMENDMENTS

Version Number	Date	Description
1.0.0	11/21	Submission to AAG.
2.0.0	04/22	Upload to SDS websites.