

Engineering Design and Draughtsperson Apprenticeship Standard – Level 3

Introduction

Engineering design and draughtspersons produce designs and drawings for structures, piping, electrical systems, control and instrumentation systems and mechanical components used in industrial and commercial construction. Typically, jobholders work in a wide range of industries of national importance including power and water infrastructure, petrochemical, oil and gas, nuclear, food and drink processing.

Jobholders are based at office locations within project design teams and occasionally work at on-site locations. They are required to understand on-site hazards and health and safety requirements.

The jobholder must: Understand technical drawings and specifications and be able to create their own; identify factors likely to affect design decisions; produce CAD (computer aided design) models and engineering drawings and; be able to communicate design information to internal and external parties.

Occupation

There are five main disciplines within the occupation of Engineering Design and Draughtsperson. An apprentice gains an understanding across all these disciplines and will typically specialise in one or more:

- Electrical Design and Draughtsperson
- Control and Instrumentation Design and Draughtsperson
- Mechanical Design and Draughtsperson
- Piping Design and Draughtsperson
- Structural Design and Draughtsperson

Duration of Apprenticeship

The duration of this apprenticeship is typically 42 months study.

Suggested Entry Requirement

Individual employers will set the selection criteria for their apprenticeships. This will typically include a requirement for a minimum of 5 GCSE grades A* - C (or equivalent qualifications) including mathematics (preferably B); English (Language); a science or technical subject. Apprentices must have achieved a GCSE to at least a grade C, a level 2 qualification in Functional Skills, or an equivalent qualification in both English and mathematics before being entered for their final apprenticeship assessment.

The following sections describe the essential core skills, knowledge and behaviours that the jobholder will demonstrate on completion of their programme.

Core Skills

- Work safely at all times, complying with relevant national and industry health and safety requirements
- Work in accordance with company management systems, policies and procedures
- Employ the appropriate use of computer based technology
- Review and interpret technical information and requirements from different sources e.g. specifications, concepts, stakeholders
- Identify inaccuracies or discrepancies in engineering drawings and specifications and propose solutions
- Identify and assess factors that affect designs e.g. materials, application, location, risk and environment
- Design engineering concepts to solve engineering challenges
- Develop effective solutions which satisfy the required standards and can be manufactured, proven, operated and maintained in a cost-effective way whilst minimising costs
- Evaluate engineering designs to determine the most effective solution
- Produce detailed engineering drawings to relevant standards and codes, using paper and computer
- Check completed drawings for quality, technical compliance and completeness - both own or those of peers
- Communicate and co-ordinate engineering design options with relevant stakeholders, colleagues and clients using sketches, schemes, models, detailed drawings and reports

Core Technical Knowledge

- Relevant national and industry health and safety, standards and legislation and those relevant to the specific disciplines, as appropriate
- Company management systems, policies and procedures
- Document management and change control
- Engineering codes and standards
- Common engineering principles and the application of maths and science to engineering
- Fundamentals of engineering drawing and design

- Computer Aided Design (CAD) software, its appropriate application including 2D and 3D modelling
- Understand the impact of relevant factors that are important to the design e.g. the context in which you are working, the materials, components, assemblies, cost, quality, safety, security, risk, environmental impact, ergonomics, aesthetics, the end use and purpose of the design
- Manufacturing and/or construction methods as appropriate to the specific disciplines
- Relevance and application of Building Information Modelling (BIM)

Core Behaviours

- Comply with health and safety requirements and company policies and procedures at all times
- Have a strong work ethic including attention to detail and commitment to completing the task in hand
- Take personal responsibility for own work, set the right example for others and actively seek opportunities for quality improvement
- Apply and uphold principles of ethics and sustainability
- Commitment to advancing own learning and competence, showing a willingness to learn new skills and an openness to others' ideas and input
- Use effective communication and interpersonal skills, showing sensitivity to others and working collaboratively
- Accept and promote equality and diversity

All jobholders require the core key skills, technical knowledge and behaviours. They will additionally need to acquire and apply the following technical knowledge from a minimum of one of these five disciplines:

Discipline	Knowledge
Electrical	<ul style="list-style-type: none"> • Electrical power generation & distribution including the principles of voltage transformation • Lighting & small power systems design • The principles of earthing & lightning protection • Cable types, specification, and installation requirements
Control and Instrumentation	<ul style="list-style-type: none"> • Combinational and sequential logic and control systems • Process and Instrument Diagrams (P&ID) • Instrument principles and application • Digital and analogue devices and circuits and their application in measurement and control • Cable types, specification, and installation requirements
Mechanical:	<ul style="list-style-type: none"> • Mechanical principles, material selection and application • Mechanical annotation including geometrical tolerances, limits and fits, surface finishes • Mechanical handling • Welding, fasteners and fabrications
Piping:	<ul style="list-style-type: none"> • Piping and flow control • Service conditions such as flow rates, material characteristics, temperature and working pressures • Isometrics • Pipe supports, welding, fittings, valves and associated equipment • Process and Instrument Diagrams (P&ID)
Structural:	<ul style="list-style-type: none"> • Structural principles and application • General arrangements of structures showing multiple materials including: steel, concrete, masonry, timber • Construction processes, methods and details • Detailed production drawings for steel and reinforced concrete

Professional Recognition and Career Progression

This standard has been designed to meet the professional standards of the Engineering Council for registration as an Engineering Technician (EngTech) in partnership with the appropriate institutions as shown below:

- Institution of Mechanical Engineers (IMechE) (for piping and mechanical)
- Institution of Structural Engineers (IStructE)
- Institution of Engineering and Technology (IET) (for electrical and mechanical)
- Institution of Engineering Designers (IED)

Professional registration is subject to candidates successfully completing this apprenticeship and undergoing professional review.

Governance and Review Date

This apprentice standard will be reviewed by an industry-led working group in 3 years.