Higher Apprenticeship – Product Design and Development Engineer Apprenticeship Standard

Designation of Occupations
"Product Design and Development Engineer" (Level 6)

Duration of Apprenticeship
Typically the duration of this apprenticeship is 5 to 6 years. This duration may be reduced for a candidate with previous relevant experience and/or someone already part qualified. Alternatively this may also be a progression route from a relevant Advanced Apprenticeship.

Suggested Entry Requirement
Individual employers will set the selection criteria for their Apprenticeships. In order to optimise success candidates will typically have 5 GCSE's at Grade C or above, including Mathematics, English and a Science, Technology or Engineering related subject, as well as A Levels at grade C or above in both a Mathematical based subject and a Science, Technology, Engineering or additional Mathematics related subject, or 90+ credits in an Engineering BTEC. The Apprenticeship as a Product Design and Development Technician provides a potential preparation route for this Apprenticeship.

Role Specific Occupational Requirements
Product Design & Development Engineers work on all stages of product creation, product modification and product componentry. They support activities ranging on early concept feasibility, Computer Aided Design and other modelling, activities and stages through to final preparation for launch and customers. This includes working in concept studios, rapid prototyping, assembly, testing, validating and analysing performance. Typically they work closely with suppliers and managers in bring new concepts to life or contributing to redesigns of existing products.

Vocational Skills: During the foundation stage the apprentice must develop a solid grasp of the core engineering skills. These skills will not only prepare the apprentice for the workplace in demonstrating that they have the required basic skills to do their core role but their competencies are stretching and transferable and can be built upon over time. The skills required are:

- How to comply with statutory requirements and stringent organisational safety requirements
- How to effectively use, interpret and evaluate a range of engineering data sources and documentation
- Organising work efficiently and effectively in managing engineering resources when completing tasks
- Producing components using hand fitting techniques and producing mechanical assemblies
- Producing Electrical or Electronic Drawings or CAD Models using a CAD system
- Preparing and using lathes, milling and other general or specialist high tech equipment
- Applying mechanical, electrical and electronic devices and equipment
- Using computer software packages to assist with engineering activities
- Producing and managing engineering project plans

During the development stage they would hone and deepen their general engineering skills in there specialist areas and also may undergo placements in relevant supportive functions to provide breadth of experience. With all of these skills, they will be using a well-planned logical and systematic approach.On successful completion of the above, the apprentice will then progress to develop their skills in:

- Project Management in undertaking engineering activities
- Establishing design briefs, presenting and discussing technical proposals
- Managing and controlling product design change
- Supporting team feasibility design reviews.
- Demonstrating technical and commercial management in planning and managing tasks & resources

Academic Knowledge: The apprentice would complete a HND or Foundation Degree which would provide the foundation stage of the knowledge elements in the competence qualification. It will support the fundamental scientific and mathematical principles that equip apprentices with the understanding required to operate effectively and efficiently at high level within this sector. As a core the engineer needs to cover around 960 academic Guided Learning Hours, in order to have a solid grasp of;-

- Mathematics and science for engineers
- Materials and manufacture
- Mechanical. electrical and electronic principles and applications
- Statics and dynamics
- How to undertake and apply business-led projects
- Engineering operations and business management
- Applying advanced technology techniques

For the Development Phase the apprentice will build on their Foundation knowledge by completing a BSc (Hons) or BEng (Hons) in Engineering. Here they will expand their understanding to a higher level and commence on specialised modules during the latter part of this qualification.

Occupational Behaviours: Modern high value engineering organisations require their apprentices to have a set of occupational behaviours that will ensure success both in their current and future roles and in meeting the overall company objectives. These required behaviours include:

Safety mindset: This occupation sits within an industry with a high level of safety critical activities. There has to be strict compliance and a disciplined and responsible approach to manage, mitigate and avoid risk.

Strong work ethic: Positive attitude, motivated by engineering; dependable, ethical, responsible and reliable.

Logical approach: Able to structure a plan and develop activities following a logical thought process, but also able to quickly "think on feet" when working through them.

Problem solving orientation: Identifies issues quickly, enjoys solving complex problems and applies appropriate solutions. Has a strong desire to push to ensure the true root cause of any problem is found and a solution identified which prevents further recurrence**.**

Quality focus: Follows rules, procedures and principles in ensuring work completed is fit for purpose and pays attention to detail / error checks throughout activities.

Personal responsibility and resilience: Motivated to succeed accountable and persistent to complete task.

Clear communicator: Use a variety of appropriate communication methods to give/receive information accurately, and in a timely and positive manner.

Team player: Not only plays own part but able to work and communicate clearly and effectively within a team and interacts/ helps others when required. In doing so applies these skills in a respectful professional manner**.**

Applies Lean Manufacturing Principles: Continuous improvement in driving effectiveness and efficiency

Adaptability**:** Able to adjust to different conditions, technologies, situations and environments.

Self-Motivation: A 'self-starter', who always wants to give their best, sets themselves challenging targets, can make their own decisions.

Willingness to learn**:** wants to drive their continuous professional development

Commitment: Able to commit to the beliefs, goals and standards of their own employer and to the wider industry and its professional standards.

Training and Development Summary: There will be two phases of training to ensure that apprentices meet this Apprenticeship standard, in line with specified employer requirements[1]. The foundation phase will be intensive off the job training focused on developing the apprentice's core skills, knowledge and behaviour, allowing them to work effectively with supervision in a largely simulated working environment. This stage will require typically 1400 Vocational Guided Learning Hours, building up from basics to more complex engineering operations and practices. The tasks will be aligned to the job role to develop a range of tailored core engineering techniques so by the end of this phase the apprentice will be able to demonstrate, under independent test conditions, that they can deploy their skills and occupational behaviours. In addition the apprentice typically undertakes an HND or Foundation Degree.

The development phase will focus on applying the apprentice's on-job vocational competence supported by further guided learning, enabling them to eventually work effectively without the need for close supervision. The competencies gained are sufficiently transferable by the end of this development phase for someone to adapt quickly to function effectively after minimal instruction on new equipment / environments or revised working practices, whilst completing an Engineering Degree. There will be a robust synoptic employer endorsement as part of the final assessment of this phase to ensure that the apprentice has demonstrated full competence against the knowledge, skills and behaviours in this standard. The employer will sign off that the apprentice is 'job ready' as a competent Professional Design and Development Engineer.

Professional Recognition and Career Progression: This standard has been designed to meet the professional standards of the Engineering Council for initial registration as an Engineering Technician (Eng Tech) in partnership with the Institution of Mechanical Engineers. Further professional development and registration is subject to candidates successfully completing the appropriate learning, developing the appropriate competence, and undergoing professional review.

Governance & Review date: March 2016 by engineering employer led trailblazer collaboration.

[1] In order to articulate the specific level of skills, knowledge and behaviours required to be achieved and assessed to demonstrate full occupational competence, the employers on the trailblazer group have developed a more detailed Employer Occupational Brief s(EOB). These brief will inform the awarding organisations of the required elements of knowledge, behaviours and vocational skills within this Apprenticeship Standard. It will also provide a clear basis for the development of the assessment of this Apprenticeship and will enable the sector to maintain world class levels of quality and ensure that the credibility, transferability and consistency of the Apprenticeship outcome is maintained.