National Apprenticeship- Occupational Profile

Apprenticeship Title: Advanced Manufacturing Engineer

NFQ Level: 8

Duration: 4 years

Typical Tasks/ Responsibilities:

The Level 8 Advanced Manufacturing Engineer will be involved in high end manufacturing and process improvements, liaising with Design Engineers and Project Managers to support the transition of traditional production to Industry 4.0.

Apply and adapt emerging technologies and data science to engineering problems and tackle higher-level technical tasks, for example data networking, systems and equipment integration.

Design experiments and formulate data driven solutions based on evidence to optimise productivity, quality, safety, sustainability and cost effectiveness.

On successful completion of the proposed apprenticeship, the Advanced Manufacturing Engineer will:

Knowledge:

- Statistical Process control
- Design For Manufacture (CAD/CAM)
- Quality Management
- Quality management systems within a regulated environment (GMP)
- Raw materials, production processes, costs, and other techniques for maximising the effective manufacture of Medical Device Products
- Root Cause Analysis, Problem Solving, Implementing corrective and preventive Actions
- Continuous Improvement in Quality and Manufacturing (Lean Six Sigma)
- Design of Experiments
- Mechanics and Properties of Materials
- Mechanics and Dynamics of Machines
- Additive, Subtractive and Formative Manufacturing
- Industrial Automation, Robotics and Control
- Digital Twin Technology
- Data Networking and Systems Integration

- Decision Theory and Data Visualisation
- Sustainable Smart Manufacturing tools and technologies
- Engineering Science
- Electrical Science
- Mechanical Drawing Interpretation
- Project management
- Cleanroom operations
- Polymer Processing
- Metrology

Skills:

Specialist Skills:

- Identify, classify, describe and monitor the performance of systems and components
- Develop innovative solutions to a variety of manufacturing problems with varying levels of complexity using engineering principles, theories and concepts
- Applying Lean and Six Sigma manufacturing principles to drive data-driven process improvement projects to enterprise level
- Design and conduct experiments and simulations, under guidance, in a peer or team relationship, to analyse and interpret data, and draw valid conclusions.
- Apply principles and methodologies of project management and quality management
- Identify and use appropriate mathematical methods and modelling for application to manufacturing engineering problems
- Processes and tooling used in relation to polymer processing, in particular injection moulding and extrusion
- Proficiency in spreadsheet and database technologies to design an effective event-based software application to monitor and visualise engineering and production requirements and timelines
- Implement electrical and mechanical sensors, signal-conditioning and digital interfacing in engineering systems
- Industrial networking and Supervisory control and data acquisition (SCADA) systems
- Advanced manufacturing processes through the innovative application of advanced automation and sustainable smart technologies, processes and methods including robotics, digital twin, vision systems, etc
- Contribute effectively to the business in highly regulated industries, acting ethically and professionally, while considering the economic, social and environmental benefits of sustainable processes and systems for manufacturing and the role of an advanced manufacturing engineer in society and at work.

- Evaluation of literature and available databases and other sources of information pertinent to an unfamiliar problem that is within the discipline of manufacturing engineering.
- Technical Report and Academic Writing, accurately referencing sources of information

Transversal Skills:

- Work Autonomously
- Work Collaboratively as part of a team
- Time management skills
- Deliver projects on time, in scope, within budget while meeting business expectations
- Engage in creative problem solving
- Appraise appropriate and available information sources applicable to engineering contexts
- Communicate effectively on manufacturing engineering activities to diverse audiences, including manufacturing employees at all levels, and to customers, suppliers and the wider public, as required.
- Lead and manage teams to deliver specific project goals and objectives
- Apply principles of critical thinking

Behaviours:

- Engineering Ethics
- Effective Communication
- Adaptability
- Teamwork
- Leadership
- Ability to work independently and manage their own time
- Decision making
- Problem solving
- Critical thinking
- Project management
- Environmental, Health, and Safety Awareness
- Recognise the need for, plan and carry through, self-directed continuing professional development (CPD)

Industry/industries served by the apprenticeship:

Medical Devices, Engineering, BioPharma, Food, Polymer Technology, Construction, AgriTech, Machinery

Proposed minimum entry requirements for apprentices on the programme:

- CAO applicants - minimum 160 points, Pass (Grade O6 or better) in five ordinary leaving certificate subjects, two of which must be Maths and a language (English or Irish). Leaving cert APPLIED is not suitable.
- Cognate QQI-FET Level 5, 6 applicants plus leaving certificate Maths.
- Mature students (over 23 years) do not require a leaving certificate but must pass a company interview.

Recognition of Prior learning to gain advanced entry into years two, three and four is available to experienced applicants who meet the required criteria. Please see the Employer Handbook or Information Leaflet for full details.