

Overview of the role

Helping to turn materials, components, or other commodities into a final product on time and at the required quality

Standard in development

L6: Manufacturing engineer (degree)

Title of occupation

Manufacturing engineer (degree)

UOS reference number

ST0025

Core and options

No

Level of occupation

Level 6

Occupational maps data

Route: Engineering and manufacturing

Pathway: Engineering, Manufacturing, Process and Control

Cluster: Manufacturing Engineer

Typical duration of apprenticeship

42 months

Degree apprenticeship

Integrated degree

Target date for approval

31/01/2025

Resubmission

No

Would your proposed apprenticeship standard replace an existing framework?

No

Does professional recognition exist for the occupation?

Yes

Occupation summary

This occupation is found in a range of sectors that involve manufacturing, for example automotive, maritime, aerospace and in wider manufacturing sectors.

The broad purpose of the occupation is to turn materials, components, or other commodities into a final product often on an assembly, production or process flow line. Manufacturing engineers select the most effective and efficient technologies and processes to manufacture a product. For a new, modified facility or product they would be involved in the design of the optimal manufacturing process and the design and layout of the manufacturing facility including discrete work areas or cells. They would identify equipment and resource requirements and also develop an operational plan for production, which may include considering manpower planning, logistics, procurement and supply chain requirements. They would also be involved in the installation and commissioning of new plant or equipment. For existing manufacturing facilities, they are involved in the monitoring of equipment, ensuring it is maintained for optimal performance. They investigate and resolve production problems and identify opportunities for improvements to increase productivity and efficiency. They ensure the facility, and its people, are safe and explore ways to reduce the impact of production on the environment whilst maintaining product quality and adherence to relevant compliance or regulatory requirements.

In their daily work an employee in this occupation interacts with a range of other engineers, functions and managers both within their own organisation and their supply chain. They may spend their working day in a variety of locations such as in manufacturing work areas but with time also spent in an office environment.

An employee in this occupation will operate with a great deal of autonomy and will be responsible for ensuring that products are launched, produced or delivered on time. They will be responsible for collecting, storing or supplying data in line with organisational requirements such as production volumes, quality, equipment efficiency, resource plans, health and safety and financial data. They will also be responsible for keeping up to date with current and developing trends in the manufacturing sector including developments in technology.

Typical job titles

Current manufacturing engineer Industrial engineer Integrated manufacturing engineer Manufacturing engineer Manufacturing excellence engineer Manufacturing process engineer Manufacturing programmes engineer Process engineer

Are there any statutory/regulatory or other typical entry requirements?

No

Occupation duties

DUTY	KSBS
Duty 1 Lead a safety culture in their defined work area at all times, ensuring their own safety and the safety of others.	K1 K2 K3 K10 K13 K23 S6 S8 S11 S16 B1 B2 B6
Duty 2 Ensure that manufacturing engineering projects comply with legislation, compliance testing, regulatory requirements, and sustainability requirements.	K1 K2 K3 K10 K11 K13 S6 S8 S11 S12 S13 B1 B2 B6 B7
Duty 3 Be proactive and take responsibility for identifying, developing and maintaining own personal and professional development.	K12 K19 B5 B6
Duty 4 Work independently or as part of a team to provide specialist manufacturing engineering leadership.	K5 K11 K21 K23 K25 S11 S16 B2 B3 B6
Duty 5 Determine the type and level of technical data analysis and information required to complete the manufacturing engineering project or task outcome.	K6 K11 K13 K18 S2 S3 S4 S5 S11 B6
Duty 6 Plan, organise and manage resources such as people, equipment, components and data to monitor progress, identify risks and any relevant mitigation to meet project or task outcomes.	K1 K2 K4 K7 K9 K13 K18 K23 S6 S7 S8 S9 S11 S16 B1 B3 B6
Duty 7 Lead and deliver manufacturing projects or programmes of work to the agreed requirements, including schedule, quality and budget.	K1 K2 K3 K4 K6 K7 K9 K10 K11 K15 K18 K19 K22 S1 S6 S7 S8 S10 S11 S14 S16 B1 B2 B3 B6
Duty 8 Develop and maintain effective working relationships with stakeholders.	K5 K21 K23 K25 S11 S16 B2 B3 B4 B6
Duty 9 Determine the appropriate problem solving and diagnostic tools and techniques to be used. Lead the problem-solving activity to enable development and modifications or updates to manufacturing facilities, systems or equipment.	K11 K13 K20 K21 S2 S5 S11 S12 S13 B6
Duty 10 Identify and lead manufacturing project and improvement activities such as supporting automation, digital transformation and other technological developments.	K1 K2 K3 K4 K7 K9 K10 K11 K13 K14 K15 K18 K19 K20 K22 K23 S1 S6 S7 S8 S10 S11 S12 S14 S16

DUTY	KSBS
	B1 B2 B3 B6
Duty 11 Produce validated designs, developments, modifications or updates to manufacturing facilities, systems or components through computer aided design, modelling, “live” testing or using virtual simulation software to industry standards.	K1 K2 K3 K4 K6 K7 K8 K10 K16 K17 K24 S3 S5 S11 S13 S14 S17 B6
Duty 12 Ensure all project or work programme documentation has been completed correctly and accurately to ensure it meets organisational compliance, industry standards or Key Performance Indicators (KPIs) and traceability requirements.	K2 K8 K9 K14 K15 K18 K23 K24 S3 S4 S6 S11 S12 S14 S15 S17 B1 B2 B6
Duty 13 Produce technical documentation with applicable supporting data or information, as required, to inform project outcomes and decision making.	K6 K7 K8 K15 K16 K18 K24 S3 S4 S11 S15 S17 B2 B6
Duty 14 Identify and share good practice and work collaboratively.	K5 K12 K14 K19 K20 S11 S12 S14 S16 B2 B5 B6

KSBS

Knowledge

K1: Safety, environmental, sustainability and security legislation, regulations and standards associated with the manufacturing engineering environment. Cyber security, statutory safety standards, carbon zero, recycling and reusability targets.

K2: Hazards, risks and safe systems of work in a manufacturing engineering environment.

K3: Principles and applications of mechanics in a manufacturing environment: motion, energy and force to ensure that systems and components function safely, efficiently and reliably.

K4: Factors that determine material selection relevant to the appropriate industry sector and manufacturing environment.

K5: Verbal communication techniques. Giving and receiving information. Matching style to audience. Barriers in communication and ways to overcome them.

K6: Principles of mathematics and scientific methods including analytical techniques. Evaluating statistical data, complex numbers and matrices required in a manufacturing environment.

K7: Principles of electrical, electronic systems, components, control and digital engineering relevant to manufacturing environments.

K8: Data collection, storage, and presentation: methods, benefits and risks.

K9: Project commercials: delays, changes and impacts.

K10: Techniques used for improving and enhancing the safety, reliability, quality, performance and sustainability of manufactured products, systems or components including strategies for the management and maintenance of plant and equipment.

K11: Troubleshooting methods for diagnosing problems, faults or establishing performance characteristics, supporting improvement opportunities.

K12: Workplace training and development techniques: personal and professional development. Coaching and transfer of knowledge.

K13: Manufacturing processes used to optimise safety, efficiency, performance, productivity and sustainability.

K14: Quality management and assurance processes.

K15: Management of change (MOC) processes: requesting change, determining viability, planning, implementing and evaluating changes to a product, system or component. Adherence to MOC, risks and limitations of MOC approval.

K16: Principles of Computer Aided Design (CAD) and the application in a manufacturing environment. tools and Computer Aided Manufacture (CAM) packages used in a manufacturing environment.

K17: Principles and applications of simulation software in a manufacturing environment.

K18: Project management techniques for project delivery: planning, resource management, cost and budget control, risk, and quality.

K19: Current and emerging technology in a manufacturing environment: mechanical and electrical integration, digitalisation, manufacturing systems, sustainability and Industry 4.0.

K20: Continuous improvement principles and techniques: Plan-do-check-act (PDCA), Lean, 6 Sigma, and Statistical Process Control (SPC). Lean manufacturing tools. Process mapping.

K21: Collaboration working methods with internal and external stakeholders: best practice, quality and performance measures, issue resolution.

K22: Manufacturing methods: turning products, materials, components or other commodities into finished products or systems.

K23: Teamwork and leadership: negotiation techniques, conflict management and development techniques.

K24: Written communication techniques. Plain English principles. Manufacturing engineering terminology. Report writing.

K25: Equity, diversity, and inclusion in the workplace. Unconscious bias.

Skills

S1: Translate conceptual ideas or technical requirements into developmental outcomes or operational designs, or specifications for systems or components.

S2: Select, use and apply approved problem-solving methods to solve problems and determine solutions or actions such as Define, Measure, Analyse, Improve, and Control (DMAIC), Failure Mode Effects Analysis (FMEA) or Plan-Do-Check-Act (PDCA).

S3: Collate and use a range of data and supporting documentation.

S4: Interpret and produce technical documentation such as schematic and circuit diagrams, engineering drawings or 3D CAD models, simulation models, project plans, engineering reports, test reports, fault reports or data analytics.

S5: Observe, record and draw accurate and auditable conclusions from data evidence.

S6: Manage assigned projects or programmes of work, taking into account factors such as resource requirements, safety, quality, cost and performance and sustainability.

S7: Apply processes for project or programme management such as escalation, audit or risk management and risk mitigation.

S8: Comply with statutory and organisational safety standards and requirements, supporting safety risk assessments and mitigate any risks identified within the design, manufacture, development or test activity.

S9: Identify and use resources, such as digital tools or technologies, human, equipment, materials or data, to complete projects or programmes of work.

- S10:** Manage a project or work programme plan.
- S11:** Manage manufacturing engineering activities.
- S12:** Apply quality management and assurance processes to identify and rectify faults, inaccuracies, discrepancies or unexpected results during the manufacturing engineering process.
- S13:** Carry out pre operations checks of engineering manufacturing systems and equipment before use.
- S14:** Manage continuous improvement activities in the operation and performance of the systems or components.
- S15:** Create, maintain and review project documentation. Record and action any non-conformities.
- S16:** Communicate with others verbally for example, colleagues and stakeholders.
- S17:** Communicate in writing for example reports and presentations.

Behaviours

- B1:** Promotes a healthy and safe working environment.
- B2:** Take responsibility for the compliance and quality of work in their area and enables others to meet these standards through effective communication, collaboration and team work.
- B3:** Agile and resilient in dealing with new and changing situations.
- B4:** Supportive of the needs and concerns of others, especially where this relates to diversity and inclusion.
- B5:** Committed to maintaining and enhancing competence of self and others through Continued Professional Development (CPD).
- B6:** Acts in an ethical and professional manner.
- B7:** Leads by example being an advocate for change and sustainable approaches.

Qualifications

English and Maths

Apprentices without level 2 English and maths will need to achieve this level prior to taking the End-Point Assessment. For those with an education, health and care plan or a legacy statement, the apprenticeship's English and maths minimum requirement is Entry Level 3. A British Sign Language (BSL) qualification is an alternative to the English qualification for those whose primary language is BSL.

Does the apprenticeship need to include any mandated qualifications in addition to the above-mentioned English and maths qualifications?

Yes

Other mandatory qualifications

BEng or BSc Honours Manufacturing engineer degree that fully aligns with the KSBs

Level: 6 (integrated degree)

Professional recognition

This standard aligns with the following professional recognition:

- Institute of Engineering and Technology (IET) for Incorporated Engineer (IEng)

Progression Routes

ST0456 Post graduate engineer L7

Subject sector area

4.2 Manufacturing technologies