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Standard in development

L7: Digital manufacturing engineering leader

Title of occupation

Digital manufacturing engineering leader

UOS reference number

ST1376

Core and options

No

Level of occupation

Level 7

Occupational maps data

Route: Engineering and manufacturing

Pathway: Engineering, Design and Development

Cluster: Design and development engineer

Typical duration of apprenticeship

36 months

Degree apprenticeship

Integrated degree

Target date for approval

31/12/2024

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 any company or industry involved in manufacturing. Some example sectors include food, aerospace, fast moving consumer goods, and automotive.

The broad purpose of the occupation is to provide technology leadership in the digital transformation within the organisation's manufacturing functions. The occupation requires a deep understanding of manufacturing operations, digital operational technologies and information technology, together with the leadership capabilities to be able to pull together these diverse competences into a coherent business strategy and be able to manage the implementation of projects. The digital manufacturing engineering leader will have an appreciation and understanding of people, processes, and technology aspects of the digital transformation within manufacturing. They will have the ability to evaluate both emerging and mature technologies to apply them within their own manufacturing setting and manage the associated business change as being critical to this role. They will ensure environmental targets and sustainability requirements are incorporated into transformation programmes.

In their daily work, an employee in this occupation interacts with a range of internal and external stakeholders such as management, engineers, senior leaders, manufacturing staff, project managers and customers. They will typically be based in a variety of locations such as in an office but can also spend time within the manufacturing environment.

An employee in this occupation will be responsible for ensuring digital manufacturing transformation is planned and completed in line with considerations such as efficiency, health and safety and sustainability requirements. The digital engineering manufacturing leader will lead people, technology programs, business process development and governance across the organisation and will have a great deal of autonomy. They may typically manage other people, which may vary based upon the size of the organisation but could include technical engineers, project managers and external contractors This role can report into operations or engineering and technology functions.

Typical job titles

Chief of digital manufacturing Digital manufacturing change lead Digital manufacturing engineering manager Digital manufacturing engineering specialist Digital manufacturing lead Digital manufacturing systems engineer Head of digital manufacturing strategy implementation

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

Yes

Entry requirements

The typical entry point would be with an existing undergraduate degree in a STEM subject or equivalent experience.

Occupation duties

DUTY	KSBS
Duty 1 Lead, develop and maintain the digital manufacturing strategy and capabilities within the organisation.	K5 K6 K7 K11 K14 K15 K16 K17 K18 K19 K20 K21 K22 K23 K24 K25 K26 S1 S2 S3 S7 S8 S11 S14 S17 S18 S19 S21 B1 B2 B5 B7
Duty 2 Lead the digital manufacturing operations development through understanding the complex manufacturing operations and the product lifecycle.	K1 K2 K3 K4 K6 K7 K11 K13 K14 K15 K16 K17 K18 K19 K20 K21 K22 K23 K24 K25 K26 S1 S2 S3 S18 S21 B1 B2 B7
Duty 3 Use systems thinking and project management skills to deliver projects on time, to cost, and to the required quality and specification in line with technology and industrialisation governance requirements.	K1 K2 K3 K4 K5 K6 K7 K11 K12 K14 K17 K18 K20 K21 K22 K24 K25 K26 S1 S2 S3 S7 S8 S9 S11 S14 S17 S18 B1 B2 B7
Duty 4 Maintain and enhance own personal, professional and technical competence.	K9 K17 K18 S5 S15 B2 B4 B7
Duty 5 Ensure best practice standards and procedures are defined, implemented and shared effectively throughout the wider organisation.	K1 K5 K6 K11 K12 K15 K17 K18 K20 K21 K22 K25 K26 S1 S2 S3 S4 S5 S14 S17 S18 S19 S20 B1 B2 B5 B7
Duty 6 Develop influential relationships and collaborate with organisations such as research and technology providers, government organisations and external suppliers to accelerate the digital journey and maximise impact.	K3 K4 K5 K8 S1 S12 S13 S14 S20 B2 B3 B6 B7

DUTY	KSBS
Duty 7 Lead and inspire transformational change in manufacturing capability and efficiency through the development and use of digital manufacturing systems organisation and skills in line with organisational strategy.	K1 K2 K3 K7 K10 K11 K12 K14 K15 K16 K17 K18 K19 K20 K21 K22 K23 K24 K25 K26 S1 S2 S3 S5 S7 S8 S9 S10 S11 S14 S17 S18 S21 B1 B2 B5 B7
Duty 8 Develop and maintain relationships with internal stakeholders to influence the wider company strategy to incorporate digital manufacturing capabilities.	K4 K5 K8 K16 S1 S12 S13 S14 S16 S20 B2 B3 B6 B7
Duty 9 Lead a safety and quality culture within the organisation ensuring all digital manufacturing capability is implemented and assured without compromising safety and security.	K6 K7 K16 K17 K18 K20 K25 K26 S1 S2 S3 S4 S6 S14 S17 S18 B1 B2 B7
Duty 10 Incorporate sustainability into digital manufacturing initiatives and consider wider environmental, societal, and governance impact.	K1 K6 K7 K10 K17 K18 K25 K26 S1 S2 S3 S10 S14 S17 S18 B2 B7 B8

KSBS

Knowledge

- K1:** Project management principles: planning, scheduling, budgeting, risk management and resource management.
- K2:** Principles of risk management and resilience: identification, management and retiring risks within product, manufacturing operations, supply chain and technology.
- K3:** Commercial and contractual requirements: commercial relationships through forms of contract, specifications, procurement, insurance, and third-party undertakings.
- K4:** Negotiation techniques, conflict management, people development techniques and diversity, equality and inclusivity considerations.
- K5:** Written communication techniques. Plain English principles, manufacturing engineering terminology and report writing.
- K6:** Technical documentation. User, system, deployment, data logging, risk register and maintenance manuals. Content and usage.
- K7:** Technology management techniques: research and development, technology maturity, technology management, technology intelligence, Proof of Concept (POC), Proof of Value (POV), the importance of critical review of published sources.
- K8:** Verbal communication techniques: Giving and receiving information. Matching style to audience. Barriers in communication and how to overcome them.
- K9:** Personal and professional development techniques to keep up to date with advances in digital manufacturing and related technologies.
- K10:** Principles of sustainability and product lifecycle engineering to design systems, products and processes that maximise energy and material efficiency and minimise the environmental impact. Sustainable manufacturing practices. Sustainable Development Goals (SDGs).

K11: Requirements management techniques throughout the lifecycle. Verification and validation.

K12: Performance management techniques to sustain and improve the system.

K13: Critical thinking and problem-solving techniques.

K14: Business case development principles: defining the value proposition for digital programs.

K15: Data governance and management principles: establishing and operating data governance and management to ensure maximum effectiveness of digital assets, regulatory requirements, ethical requirements, transparency, accountability, privacy, fairness, GDPR.

K16: Strategic leadership techniques: vision, developing organisations, business transformation.

K17: Digital manufacturing techniques and technology: Emerging industry x concepts, digital manufacturing maturity assessments, digital architectures for manufacturing, technology domains, industrial data science frameworks and industrial data standards.

K18: Awareness of the application of Artificial Intelligence (AI) in manufacturing.

K19: Business transformation: Business change management processes and techniques.

K20: Product and design safety requirements for manufacturing systems.

K21: Technical change: Management of Change (MOC), process for requesting, determining impact, planning, implementing and evaluating changes to a product, system or component in line with quality management systems.

K22: Industrial cyber security – industrial security frameworks and landscape.

K23: Global and cultural trends: global manufacturing trends and cultural awareness for understanding international manufacturing dynamics.

K24: Systems thinking: principles of managing complexity and ambiguity through systems thinking techniques in heterogenous environments.

K25: Advanced manufacturing and automation technologies: innovative manufacturing techniques: additive, biological, and digital manufacturing. The use and integration of robotics and automation in manufacturing processes, how these technologies enhance efficiency and innovation in production.

K26: Optimised manufacturing systems and strategies: optimised manufacturing processes. Integration of services with physical products (servitization) in manufacturing. Lean and agile manufacturing principles. The importance of streamlined, adaptable, and efficient manufacturing operations.

Skills

S1: Translate conceptual ideas or technical requirements into developmental outcomes, operational designs or specifications for systems or components to solve manufacturing challenges such as compliance, technology, technical or physical challenges.

S2: Evaluate, select and apply problem-solving methods, including interdisciplinary approaches and systems thinking, to solve complex problems and determine appropriate solutions or actions.

S3: Manage projects with consideration for various interacting factors such as people and resources, budget, risks, organisational, time and task management, legal, contractual, and statutory requirements.

S4: Comply with statutory and organisational safety standards and requirements, supporting safety risk assessments and mitigating any risks identified within the design, manufacture, development, or test activity.

S5: Identify and analyse areas for improvement and lead continuous improvement activities in the operation and performance of the system or component.

S6: Configure and check all systems and equipment for safe operation before use.

- S7:** Utilise design thinking and human centric design approaches.
- S8:** Determine the feasibility and applicability of complex digital manufacturing solutions, including the integration of multidisciplinary technologies. Evaluate these solutions for suitability with considerations such as efficiency, sustainability, and alignment with novel Industry initiatives.
- S9:** Complete requirements gathering, such as user, technical and environmental and prioritise key areas.
- S10:** Design and implement digital manufacturing systems and architecture considering technical requirements and standards to sustainable practice and the whole product lifecycle and environmental impact for both short-term and long-term.
- S11:** Analyse and evaluate data and use outcomes to make recommendations and formulate actions.
- S12:** Communicate verbally to stakeholders through methods such as presentations, digital media, and discussions.
- S13:** Collaborate with stakeholders. Strategically manage differing and competing interests with stakeholders.
- S14:** Communicate in writing.
- S15:** Identify and complete opportunities for personal and professional development.
- S16:** Mentor and guide colleagues on the technical aspects of digital manufacturing and related technologies, focusing on continuous learning and adaptation to emerging trends.
- S17:** Apply technologies in line with maturity levels within solution design and development.
- S18:** Apply critical thinking and analytical skills.
- S19:** Conduct quality assurance, regular system inspection, critical evaluation, quality control, testing and maintenance procedures.
- S20:** Apply and promote policies and practices to support equity, diversity and inclusion.
- S21:** Lead and manage change in the context of digital transformation in manufacturing settings.

Behaviours

- B1:** Act as a role model and advocate for health and safety.
- B2:** Act in a professional and ethical manner.
- B3:** Collaborate and promote teamwork across disciplines.
- B4:** Commit to their own, and support others', professional development.
- B5:** Lead by example to promote innovation using critical and analytical thinking.
- B6:** Lead by example to promote accessibility, equality, diversity and inclusion.
- B7:** Adapt and be resilient to challenging or changing situations with empathy and an agile mindset.
- B8:** Act as a role model and advocate environmental, societal and governance best practices.

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

Masters degree in digital manufacturing leadership that fully aligns with the KSBs within the apprenticeship standard

Level: 7 (integrated degree)

Professional recognition

This standard partially aligns with the following professional recognition:

- Institution for Mechanical Engineers (IMechE) for Incorporated Engineer (IEng)

This programme has been designed to align with the requirements of the engineering profession. This does not guarantee recognition by either the Engineering Council or the professional engineering institutions (PEIs) it licenses, unless the programme has been formally recognised (approved or accredited) by one or more PEIs and listed on the Engineering Council's recognised course search database which can be found on their website. Anyone seeking professional registration or further advice is advised to contact the appropriate PEI to discuss their application.

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

This programme has been designed to align with the requirements of the engineering profession. This does not guarantee recognition by either the Engineering Council or the professional engineering institutions (PEIs) it licenses, unless the programme has been formally recognised (approved or accredited) by one or more PEIs and listed on the Engineering Council's recognised course search database which can be found on their website. Anyone seeking professional registration or further advice is advised to contact the appropriate PEI to discuss their application.

Progression Routes

Subject sector area

4.2 Manufacturing technologies