

Standard in development

L3: Machinist

Title of occupation

- Machinist

UOS reference number

ST1305

Core and options

No

Option title/s

Level of occupation

Level 3

Route

Engineering and manufacturing

Typical duration of apprenticeship

42 months

Target date for approval

01/09/2022

Resubmission

No

Would your proposed apprenticeship standard replace an existing framework?

Yes

Not a replacement for a framework but the proposed apprenticeship will replace option 9 in ST0457 Engineering Technician occupational standard.

Does professional recognition exist for the occupation?

Yes

Royal Aeronautical Society (RAeS) – Engineering technician (Eng Tech) Institution of Engineering and Technology (IET) - Engineering technician (Eng Tech) Institution of Mechanical Engineers (IMECHE) - Engineering technician (Eng Tech)

Occupation summary

This occupation is found in Advanced Manufacturing and Engineering (AME) including the Aerospace, Automotive, Maritime Defence, Nuclear and Construction sectors. Machinists produce complex and precision machined products that are typically used in machinery such as aeroplanes and vehicles. They can also produce bespoke components or products for domestic appliances or medical equipment. Machinists use a variety of machines to carry out their work. For example, centre lathes, vertical and horizontal milling machines, horizontal and cylindrical grinding machines, electro discharge machines, single and multi-axis Computer Numeric Control (CNC) machine tools centres, Gear cutting and Gear Grinding machines.

The broad purpose of the occupation is to produce complex and precision work, machining components from metal or specialist materials using conventional or CNC machine tools. Machinists interpret information and plan their activities. They also set up, operate, adjust or edit machine tool settings. When using CNC equipment, they can produce, prove or edit programmes. They inspect components and machinery, report issues and support continuous improvement activities. Machinists typically work in a manufacturing environment. Depending on the organisation, they may also be required to work shifts.

In their daily work, an employee in this occupation interacts with other Machinists and various stakeholders. They typically report to an engineering or manufacturing team leader as part of a defined or cross functional team. They may also interact with customers, suppliers, colleagues, quality auditors and regulators.

An employee in this occupation will be responsible for the quality and accuracy, efficiency and productivity of the work they undertake within the limits of their personal authority. They must work both individually and as part of a larger team. They must work within the relevant health, safety and environmental regulations, including use of appropriate protective clothing and equipment and working at height. They are responsible for the correct use and housekeeping of machinery, tools and equipment. All work must be completed in a safe and efficient manner as directed by supervisory staff.

Typical job titles

Centre lathe turner Cnc centre lathe turner Cnc edm machinist technician Cnc gear cutter Cnc gear cutter and grinder Cnc horizontal borer Cnc machinist Cnc machinist (miller turner or grinder) Cnc machinist programmer Cnc vertical borer Conventional vertical borer Edm machinist technician Gear cutter Gear cutter and grinder Horizontal borer Machining technician Machinist Manual machinist (miller turner or grinder) Precision engineer

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

Yes

Entry requirements

Individual employers will set the recruitment and selection criteria for their Apprenticeships. In order to optimise success, candidates will typically have 4 GCSEs at Grade 4 or Grade C or equivalent, including mathematics, English and a Science.

Occupation duties

DUTY	KSBS
Duty 1 Conduct safety checks and performance monitoring for machining, associated equipment and surrounding work area.	K1 K2 K3 S1 S2 S5
Duty 2 Receive, read and interpret engineering data and documentation; engineering drawings and technical data. Contribute to or plan the days machining schedule.	K4 K5 K6 S3 S8 S9 B2 B3 B4
Duty 3 Check and inspect materials to be machined to ensure that they conform to quality standards. Identify and report any issues or faults such as incorrect grades, dimensions and thicknesses.	K7 K23 S6 S7
Duty 4 Plan and prepare sequence for the machining activities. Ensure that the correct tooling, work holding, and materials are used for conventional complex or CNC complex machining tasks.	K6 K9 S3 S9 S12 S13 B2 B4
Duty 5 Set up, operate, adjust or edit conventional or CNC machining equipment settings for the machine tool being used.	K10 S4 S12 S13
Duty 6 Machine high-quality complex components using a broad range of processes. For example, internal or external thread cutting, slots and pockets, internal or external under cutting, profile forms, tapered and eccentric diameters, bored holes, and tee slots.	K11 S11 S12 S13 S14
Duty 7 Inspect components produced. Adjust the machining equipment or programme and tooling to ensure components meet quality requirements.	K8 K12 K14 K19 S10 S15 B2
Duty 8 Identify, communicate and report issues effecting machining component quality, quantity and deadlines.	K13 S16 S17 S18
Duty 9 Complete machining documentation at all stages of the work activity. For example, standard operational procedures, control documentation and contribution to audits.	K15 K16 S7 S20
Duty 10 Maintain and restore the machining work area, performing housekeeping and waste management as appropriate. Ensure tools, unused materials and equipment are returned to a safe, clean and approved condition on completion of machining work.	K17 S19 S21

DUTY	KSBS
Duty 11 Keep stakeholders for example, customers, colleagues and line managers informed about machining work.	K15 K16 K18 K22 S20 B3 B4
Duty 12 Perform scheduled daily inspection and machine shut down or safe isolation.	K17 S21
Duty 13 Support continuous improvement activity to address business problems.	K20 K21 S22 B1 B5 B6

KSBS

Knowledge

K1: Awareness of health and safety regulations, relevance to the occupation and the Machinist's responsibilities. Health and Safety at Work Act; Control of Substances Hazardous to Health (COSHH); Working in Confined Spaces; Lone Working; Provision of Work Equipment Regulations (PUWER); Electrical Safety and Compliance; Noise Regulation; Slips Trips and Falls; Display Screen Equipment; The Reporting of Injuries, Disease and Dangerous Occurrences Regulations (RIDDOR), Manual Handling, Personal Protective Equipment (PPE), risk assessments and method statements and the implications of not adhering to guidelines and procedures.

K2: Awareness of hazardous waste regulations; Recyclable materials and waste disposal procedures and the implications of not complying with regulations and procedures.

K3: Awareness of environment and sustainability regulations, relevance to the occupation and the Machinist's responsibilities. Environmental Protection Act; Sustainability; Waste Electrical and Electronic Equipment Directive (WEEE); Energy monitoring; Data logging to optimise energy performance; The Climate Change Agreements; Carbon Reduction Commitment (CRC).

K4: Engineering representations, drawings, graphical information and specifications.

K5: Engineering mathematical and scientific principles: calculations, conversions, flow rates and equipment sizing.

K6: Planning techniques, time management, workflow, work scheduling, work plans, documents and work categorisation systems.

K7: Engineering materials and their structure, properties and characteristics; impact on use, how and why engineering materials can fail.

K8: Awareness of engineering standards and regulations: British Standards (BS); International Organisation for Standardisation standards (ISO); European Norm (EN); Standard Operating Procedures (SOP).

K9: Tooling and work-holding devices: purpose and operation of devices for carrying out complex machining tasks.

K10: Engineering machining processes tools and equipment: Milling; Turning; Grinding; Electro Discharge Machine (EDM); Gear Cutting.

K11: Machining operations and techniques to produce complex components.

K12: Quality assurance: principles, practices and record keeping.

K13: Fault finding, diagnostic methods and techniques for identifying engineering and manufacturing problems.

K14: Use and application of measurement, calibration and testing equipment.

K15: Communication techniques: verbal and non-verbal.

K16: Documentation - electronic and paper.

K17: Housekeeping and maintenance practices and techniques: planned, preventative and predictive methods, frequency, and reactive activities.

K18: How organisations vary regarding their work, culture, values and production processes in the Machining industry.

K19: Inspection processes and procedures; documentation and escalation.

K20: Technological development and innovation in the machining sector; Industry 4.0; digitalisation.

K21: Continuous improvement principles and practices: Lean; Six Sigma; Kaizen.

K22: Equality, diversity and inclusion requirements in the workplace.

K23: Stock and services considerations. Availability, stock lead times. Correct handling. Stock value. Faulty stock and returns process.

Skills

S1: Comply with statutory health and safety regulations and procedures.

S2: Comply with environmental, ethical and sustainability regulations and procedures: safe disposal of waste, re-cycling or re-use of materials and efficient use of resources.

S3: Prepare and set up conventional or CNC machines.

S4: Operate and adjust conventional or CNC machines.

S5: Apply risk assessment and hazard identification processes and procedures in the work area.

S6: Monitor, obtain and check stock and supplies, and complete stock returns.

S7: Record information - paper based or electronic. For example, energy usage, job sheets, risk assessments, equipment service records, test results, handover documents and manufacturers' documentation, asset management records, work sheets, checklists, waste environmental records and any legal reporting requirements.

S8: Read and interpret information. For example, data and documentation used to produce machined components.

S9: Plan and organise own work and resources.

S10: Interpret, follow and apply quality assurance procedures and processes.

S11: Select machining process.

S12: Select and setup tooling and work holding devices.

S13: Set and adjust machine operating parameters. For example, setting feeds and speeds for roughing and finishing operations.

S14: Apply machining operations and techniques to produce complex components with features. For example, parallel; stepped; angular diameters and faces; grooves; slots; recesses and undercuts; radii and chamfers; internal and external forms and profiles; reamed; bored; drilled and electro eroded holes; internal and external screw threads.

S15: Measure and test components.

S16: Check condition of tools and equipment. Identify actions needed.

S17: Identify issues or concerns.

S18: Apply fault-finding and diagnostic testing procedures to identify faults. Diagnose and resolve issues. Escalate issues.

S19: Restore the work area on completion and return any resources and consumables.

S20: Communicate with colleagues and stakeholders: verbal and non-verbal.

S21: Follow machine shut down, safe isolation, handover, start up or warm up procedures. Escalate issues.

S22: Apply continuous improvement techniques. Devise suggestions for improvement.

Behaviours

B1: Apply an ethical approach.

B2: Accept responsibility for the work of themselves and others.

B3: Team-focus to meet work goals, for example, work effectively with others, resolves issues in discussion with others.

B4: Respond and adapt to work demands.

B5: Committed to continued professional development (CPD) to maintain and enhance competence in their own area of practice.

B6: Support a diverse and inclusive culture.

Qualifications

English & 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

Diploma in Machining (Title to be confirmed by TB group)

Level: 3

Additional information:

Professional recognition

This standard aligns with the following professional recognition:

- Royal Aeronautical Society (RAeS) for Engineering Technician (EngTech)
- Institution of Engineering and Technology (IET) for Engineering Technician (EngTech)

- Institute of Mechanical Engineers (IMechE) for Engineering Technician (EngTech)

Involved employers

Consultation

Progression Routes

ST0841 Engineering manufacturing technician L4

ST0999 Lead engineering maintenance technician L4

Supporting uploads

Mandatory qualification uploads

Professional body confirmation uploads

Involved employers