

Standard in development

L3: Mechatronics Maintenance Technician

Title of occupation

Mechatronics Maintenance Technician

UOS reference number

ST1326

Core and options

No

Level of occupation

Level 3

Occupational maps data

Route: Engineering and manufacturing

Pathway: Maintenance, Installation & Repair

Cluster: Service, repair and or overhaul operative or technician

Typical duration of apprenticeship

42 months

Target date for approval

01/09/2024

Resubmission

No

Would your proposed apprenticeship standard replace an existing framework?

No

Does professional recognition exist for the occupation?

Yes

Professional recognition

Completion of the Apprenticeship is designed to be recognised by relevant Professional Engineering Institutions at the appropriate level of professional registration (EngTech).

Occupation summary

This occupation is found in the aerospace, aviation, automotive, defence, logistics, pharmaceutical, energy, food and drink, and wider advanced manufacturing and engineering sectors which utilise automated equipment with integrated systems and interfaces, where the equipment contains a blend of technologies such as mechanical, electrical, electronic and control, and fluid power.

The broad purpose of the occupation is to ensure that plant and equipment perform to the required standard to facilitate targets regarding safety, quality, delivery, availability and cost within the aerospace, aviation, automotive, logistics, defence and wider advanced manufacturing and engineering sectors. Multi-skilled mechatronics maintenance technicians carry out a broad range of activities which may include installation, testing, fault finding, rectification, modifications and the on-going planned maintenance of complex automated equipment. This requires the application of a blend of skills, knowledge and occupational behaviours across the electrical, electronic, mechanical, fluid power and control systems disciplines. They prepare for the maintenance activity and inform stakeholders of work status. They also complete documentation, handover work, set up their work area and are required to be competent in safe engineering practices for their own safety and those around them. They may be required to work shifts, to work at height and in confined spaces, as well as dealing with equipment which may contain high voltages, high pressures, ionising radiation and other hazards.

In their daily work, an employee in this occupation interacts with a wide range of potential stakeholders and others such as other technicians, engineering leaders, production operators, production leaders, business managers, customers, contractors, external agencies and members of the public. They may work in a range of environments including factories, hangars and workshops, as well as outside.

An employee in this occupation will be responsible for the quality and accuracy of the work they undertake within the limits of their personal authority, whilst complying with national and international legislation, civil or military regulatory and organisational requirements. All work must comply with health and safety legislation, environmental legislation and the employers own specific rules and guidance. They carry out complex maintenance activities on high value equipment across a wide range of equipment types and are responsible for the health and safety of themselves, their colleagues and others who may be affected by the work. They are required to complete tasks within defined timescales. They need to work autonomously, professionally and responsibly to regulatory and organisational requirements. Depending on the organisation they may be required to work on their own or as part of a team. They are responsible for the correct use and fitness for purpose of tools and equipment, and for maintaining their own continued professional development.

Typical job titles

Field service maintenance technician Maintenance team member Maintenance technician Mechatronics maintenance technician Mechatronics technician Multi-skilled site maintenance technician

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

No

Occupation duties

| DUTY | KSBS |
|---|---|
| Duty 1 Accept responsibility for the task and complete any preparatory documentation or opening of electronic recording that may be required to commence the task. | K1 K2 K3 K5 K8 K9 K16 K18 K24 K26 K27 K28 S1 S2 S5 S7 S8 S10 S13 S20 S25 B3 B4 B5 |
| Duty 2 Plan and prepare the maintenance activities to cause minimal disruption to normal working, agree planned actions and obtain any required permits or permissions required to carry out the task. Communicate and report issues affecting equipment availability that may impact on operations. | K1 K3 K4 K5 K8 K9 K10 K11 K19 K24 K27 K28 K29 K32 K36 S2 S3 S4 S5 S7 S10 S25 B3 B4 B5 |
| Duty 3 Select, obtain and prepare all resources required to carry out the task for example: tools, materials, documentation, permits. Carry out pre-use | K6 K7 K8 K9 K16 K19 K23 K24 K27 K28 S2 S5 S6 S7 S8 S10 S25 B3 B4 B5 |

| DUTY | KSBS |
|---|--|
| checks of equipment, tools and other resources. | |
| Duty 4 Set up safe systems of work ensuring that statutory regulations and organisational compliance requirements are met. | K7 K8 K9 K10 K11 K16 K24 S2 S7 S8 S9 S20 B4 B5 |
| Duty 5 Manufacture, repair or refurbish components using a range of hand and machine tools. | K7 K8 K11 K22 K24 K27 K28 K35 K37 S6 S7 S10 S19 B3 B4 B5 |
| Duty 6 Perform mechatronics maintenance activities ensuring all parts and consumables used in the maintenance activity comply with manufacturers specifications. | K2 K7 K8 K13 K14 K15 K22 K24 K27 K28 K35 K36 K37 S3 S4 S6 S7 S9 S12 S14 S17 S19 B3 B4 B5 |
| Duty 7 Revise, edit, update and store documentation. Comply with organisational policies and legislation regarding document and electronic storage. | K1 K3 K5 K16 K17 K18 K24 K26 K27 K28 K33 S1 S7 S8 S13 S15 S16 S19 S20 B3 B4 B5 |

| DUTY | KSBS |
|------|------|
|------|------|

Duty 8 Carry out planned preventative maintenance including functional, static and operational checks on complex equipment and assets.

K2 K6 K7 K8 K10 K13 K14 K15 K19 K24 K27 K28 K36
S4 S6 S7 S9 S14 S15 S17 S19
B3 B4 B5

Duty 9 Apply condition monitoring techniques or use condition monitoring results (for example oil, vibration, thermal, NDT) to determine equipment condition.

K6 K7 K20 K21 K27 K28
S7 S16 S17 S19
B3 B4 B5

Duty 10 Use a range of test and measuring equipment (including both electrical and physical measures) and appropriate calculations required to carry out the task and to aid in fault diagnosis.

K2 K6 K7 K8 K12 K13 K15 K20 K22 K23 K24 K25 K27 K28 K31 K37
S1 S6 S7 S15 S18 S19
B3 B4 B5

Duty 11 Return equipment to operational condition, re-connect any ancillary equipment and services, and carry out

K2 K6 K7 K8 K10 K22 K24 K25 K26 K27 K28 K37
S6 S7 S11 S21 S22
B3 B4 B5

| DUTY | KSBS |
|--|---|
| required functional, static, quality and operational checks to confirm equipment serviceability and fitness for purpose. | |
| Duty 12 Restore workplace and leave in a safe condition. Hand over completed work to responsible parties confirming completion of maintenance activities. | K1 K5 K7 K8 K16 K24 K27 K28 K29 S3 S6 S7 S11 S13 S15 S21 S22 S25 B3 B4 B5 |
| Duty 13 Carry out continuous improvement and identify possible opportunities for improvements and efficiencies which add value to business activities. | K17 K27 K28 K30 K31 S23 S24 S27 B2 B3 B4 B5 |
| Duty 14 Communicate with stakeholders to achieve work goals. | K3 K4 K5 K16 K32 K33 K34 S1 S11 S20 S25 S26 B1 B4 B5 |

KSBS

Knowledge

K1: Information Technology: spreadsheets, presentations, word processing, email, digital collaboration tools.

K2: The typical engineering problems which may arise within the maintenance environment.

K3: How to plan and communicate activities.

K4: Principles of equity, diversity, and inclusion in the workplace. Unconscious bias. Conscious inclusion.

K5: Fundamentals of engineering maintenance: documentation, safety checks, standard operating procedures, estimating planned equipment downtime, cost management, document validity.

K6: Engineering materials and consumables, their structure, properties and characteristics, how and why engineering materials can fail.

K7: Engineering standards and regulations requiring compliance in the engineering workplace. For example BS or EN standards and wiring regulations.

K8: Health and safety regulations to include Health and Safety at Work Act 1974, Control of Substances Hazardous to Health (COSHH), Reporting Injuries, Diseases and Dangerous Occurrences Regulations (RIDDOR), Safe Systems of Work, Risk Assessments, Manual Handling, Lifting Operations and Lifting Equipment Regulations (LOLER), working at height, PPE, Provisions and Use of Work Equipment Regulations (PUWER), Noise Regulations, Display Equipment Regulations, confined spaces, Dangerous substances and Explosive atmospheres regulations.

K9: Organisational safety compliance requirement such as permits to work, risk assessment, method statements, near miss and accident reporting, hazard reduction hierarchy including use of personal protective equipment.

K10: Principles and procedures to identify and mitigate risks associated with electrical, mechanical, gas, air and fluids, such as isolation, dissipation of stored energy, lock off, tag out and verifying procedures.

K11: Principles and procedures to identify and mitigate hazards associated with work equipment, such as trailing leads or hoses, damaged tools and equipment, damaged or poor fitting handles.

K12: Principles, techniques and processes of sensory testing: sight, touch and smell.

K13: Principles of mechanical, electrical, electronic, control, robotic and AI applications. Knowledge of key technologies, fluid power, hydraulic, electrical, electronic, mechanical, control systems.

K14: How mechanical, electrical, electronic, fluid power, PLCs, robotics and digitally integrated systems work and are combined in complex mechatronics systems.

K15: Fault finding methodologies: half split, input output, 6-point method, functional testing.

K16: Documentation: validity, compliance, traceability and audit, approval and change management processes

K17: Quality management systems and accreditations: ISO9001.

K18: Maintenance and storage of software programmes and back-up copies.

K19: Processes and techniques of planned and preventative maintenance activities. Principles of equipment selection and use and minimising down time.

K20: Principles, techniques and processes of condition monitoring and non-destructive testing: dye-penetrant and eddy current crack detection, vibration analysis, infra-red heat detection, oil analysis techniques.

K21: Principles and purpose of interpreting data from condition monitoring and non-destructive testing.

K22: Engineering, mathematical and scientific principles, methods and techniques used in the mechatronics maintenance environment: graphical expressions, symbols, formulae, units, measures, calculations and scaling.

K23: Principles of using and calibrating electrical and mechanical testing and measuring equipment.

K24: Types of engineering drawings and diagrams and their purpose.

K25: Principles, procedures and benefits of full operational and functional tests and checks on maintained, repaired and installed equipment.

K26: Principles, processes and importance of maintaining documentation: accuracy, engineering discipline, signatures.

K27: Environmental hazards that can arise from maintenance operations. Types of pollution and control measures: noise, smells, spills, and waste. Environmental permits. Waste Electrical and Electronic Equipment Directive (WEEE).

K28: Sustainability principles and processes: the 3 'R's' (Reduce, Re-use, Recycle), segregation and disposal of waste and by-products.

K29: Principles and techniques of good housekeeping including '4S' and '5S'.

K30: Continuous improvement methods, concepts and techniques to collect and record data including graphical techniques.

K31: Data analysis principles used to identify trends and issues impacting operational performance.

K32: Verbal communication techniques. Giving and receiving information. Matching style to audience. Barriers in communication and how to overcome them.

K33: Written communication techniques. Plain English principles. Engineering terminology. Report writing.

K34: Non-verbal communication techniques: gestures, facial expressions, tone of voice, body language.

K35: Principles and techniques for manufacturing, repairing and refurbishing components using hand and machine tools.

K36: Principles and techniques of conducting initial assessment of equipment that requires maintenance.

K37: Techniques and processes used in reactive maintenance, fault diagnosis and repair activities on complex engineered systems such as electrical, electronic, mechanical, fluid power and control systems.

Skills

S1: Use information technology, for example to create documentation, communication and information management.

S2: Obtain, read and interpret task related documentation, such as work instructions, quality control documents, drawings, operation manuals, specifications and service manuals.

S3: Record information for example 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.

S4: Conduct initial assessment of equipment that requires maintenance.

S5: Formulate plans setting out the methodology of the maintenance activity including timescales and resources.

S6: Select, prepare and use material, consumables, tools and equipment.

S7: Comply with health and safety regulations and organisational requirements applicable in the workplace. For example, COSHH, PUWER, LOLER, PPE and applying safe systems of work.

S8: Apply dynamic risk assessment, hazard identification and risk mitigation principles and techniques.

S9: Apply isolation principles and techniques to equipment undergoing maintenance, including dissipation of stored energies as required.

S10: Manufacture, repair and refurbish components using hand and machine tools.

S11: Restore the workplace on completion of the maintenance activity. Handover resources, consumables and equipment to process owner.

S12: Apply the techniques and processes used in reactive maintenance, fault diagnosis and repair activities on complex engineered systems such as electrical, electronic, mechanical, fluid power and control systems.

S13: Produce, maintain, update, record and store documentation including electronic items such as PLC and robot programmes.

S14: Apply techniques and processes used in planned and preventative maintenance activities on engineered systems such as electrical, electronic, mechanical, fluid power and control systems.

S15: Apply functional testing and checking techniques and processes after maintenance interventions, and handover to the operational team.

S16: Apply techniques and processes used in condition monitoring, non-destructive and sensory testing. Record findings and take necessary actions.

S17: Apply calculation techniques such as, feeds, speeds, tolerances, electrical calculations using Ohms law, power calculations and cable sizing calculations.

S18: Use and calibrate electrical and mechanical testing and measuring equipment.

S19: Produce sketches or drawings to support maintenance activities.

S20: Communicate in writing. Prepare communications, documents and reports on technical matters.

S21: Segregate, separate and dispose of waste streams and by-products.

S22: Apply 4S or 5S principles of housekeeping to the work environment.

S23: Identify opportunities and make recommendations to improve operational performance.

S24: Apply continuous improvement techniques.

S25: Communicate with others verbally. Negotiate with colleagues or stakeholders. For example, to access equipment or arrange access to equipment.

S26: Follow equity, diversity and inclusion procedures.

S27: Carry out and record planned and unplanned learning and development activities.

Behaviours

B1: Supportive of the needs and concerns of others, for example relating to diversity and inclusion.

B2: Committed to continued professional development (CPD) to maintain and enhance competence.

B3: Take personal responsibility for their own sustainable working practices.

B4: Take personal responsibility for and promote health and safety.

B5: Act in a professional manner.

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

Level 3 Diploma in Advanced Manufacturing Engineering (Development Knowledge)

Level: 3

Professional recognition

This standard aligns with the following professional recognition:

- Institute of Engineering and Technology (IET) for Engineering Technician
- Institution of Mechanical Engineers (IMechE) for Engineering Technician

Consultation

Progression Routes

ST0841 Engineering manufacturing technician 1.0 L4

ST0025 Manufacturing engineer (degree) v1.0 L6

Supporting uploads

Mandatory qualification uploads

Mandated degree evidence uploads

Professional body confirmation uploads

Involved employers

Gatwick Airport Ltd, JLR, Toyota, Dematic, MOD (RAF Ground Trades), MOD (Submarine servicing and overhaul), BMW, Britvic, JCB, Rolls Royce, Babcock, Perkins, Teledyne, Siemens, Nissan, Lander, Ford, The Royal Mail, MOD (REME), MOD (Defence Laboratories)

Subject sector area

4.1 Engineering