Standard
L3: Food and drink maintenance engineer

UOS reference number
ST0195_V1.1

Title of occupation
Food and drink maintenance engineer

Core and options
No

Resubmission
No

Level of occupation
Level 3

Route
Engineering and manufacturing

Typical duration of apprenticeship
42 months

Target date for approval
01 April 2022

Occupational profile

Summary
This occupation is found in the engineering function in the food and drink manufacturing sector. The sector uses highly automated equipment and technology to produce a wide range of food and drink products for consumers.

Food and drink manufacturers range in size from small to large. Technicians may work directly for a food and drink company or a contractor.

The broad purpose of the occupation is to maintain food and drink machinery and equipment to optimise production levels. They conduct planned and predicative maintenance to prevent issues occurring and also reactive maintenance for example, to respond to breakdowns. They lead or support food and drink operational teams with machinery change overs and set ups. Contributing to the installation and decommissioning of food and drink equipment and machinery is also part of the role. Working with other teams, they contribute to technical performance reviews and continuous improvement activities. They may need to contribute to food and drink audits.

They may complete work as part of a team or alone, depending on the task.

In their daily work, food and drink maintenance technicians interact with other technicians and engineers. They also interact with operational and site teams. This may include quality, and research and development. They may also have contact with auditors, regulators, and customers undertaking site visits.

They typically report to an engineering lead. They work with minimal supervision. An employee in this occupation is responsible for using engineering practices that ensure food safety in line with food safety legislation. Keeping machinery and equipment available to meet production needs and outputs is key. They must comply with food safety, health and safety, environmental, sustainability, and engineering regulations and standards. They also must also take account of business operation considerations such as cost and service level agreements.

They are likely to be required to work a range of shifts, including unsociable hours.

Typical job titles
['Food and drink maintenance engineer', 'Food and drink multi-skilled engineer']
<table>
<thead>
<tr>
<th>Duty</th>
<th>Knowledge</th>
<th>Skills</th>
<th>Behaviours</th>
</tr>
</thead>
<tbody>
<tr>
<td>D1: Prepare for food and drink maintenance work.</td>
<td>K1, K2, K8, K9, K11, K13, K14, K15, K16, K17, K18, K19, K20, K22, K42, K44, K45, K47</td>
<td>S1, S2, S3, S4, S5, S6, S7, S9, S26, S28, S29</td>
<td>B1, B2, B3, B4, B5, B6, B7</td>
</tr>
<tr>
<td>D2: Conduct planned maintenance of food and drink processing and packaging equipment.</td>
<td>K1, K2, K3, K4, K5, K6, K7, K8, K9, K10, K11, K12, K13, K14, K15, K16, K17, K18, K19, K20, K21, K22, K24, K26, K27, K28, K29, K30, K31, K32, K33, K34, K35, K36, K37, K38</td>
<td>S1, S3, S4, S5, S6, S7, S8, S9, S10, S11, S13, S17, S24</td>
<td>B1, B2, B3, B4, B7</td>
</tr>
<tr>
<td>D3: Conduct predictive maintenance of food and drink processing and packaging equipment (condition based monitoring).</td>
<td>K1, K2, K3, K4, K5, K6, K7, K8, K9, K10, K11, K12, K13, K14, K15, K16, K17, K18, K19, K20, K21, K22, K24, K26, K27, K28, K29, K30, K31, K32, K33, K34, K35, K36, K37, K38</td>
<td>S1, S3, S4, S5, S6, S7, S8, S9, S10, S11, S12, S13, S17, S24</td>
<td>B1, B2, B3, B4, B7</td>
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<td>D4: Respond to breakdowns of food and drink processing and packaging equipment. Conduct reactive maintenance or corrective actions to resolve deviation.</td>
<td>K1, K2, K3, K4, K5, K6, K7, K8, K9, K10, K11, K12, K13, K14, K15, K16, K17, K18, K19, K20, K22, K24, K25, K26, K27, K28, K29, K30, K31, K32, K33, K34, K35, K36, K37, K38, K39, K40, K45</td>
<td>S1, S3, S4, S5, S6, S7, S8, S9, S10, S11, S17, S19, S20, S22, S24, S25</td>
<td>B1, B2, B3, B4, B6, B7</td>
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<td>D5: Identify faults (electrical, mechanical, instrumentation, automation and pneumatics) on food and drink processing and packaging equipment and action required.</td>
<td>K1, K2, K3, K4, K5, K6, K7, K8, K9, K10, K11, K12, K13, K14, K15, K16, K17, K18, K19, K20, K22, K24, K25, K26, K27, K28, K29, K30, K31, K32, K33, K34, K35, K36, K37, K38, K39, K40</td>
<td>S1, S3, S4, S5, S6, S7, S8, S9, S10, S11, S17, S20, S22, S24, S25</td>
<td>B1, B2, B3, B4, B6, B7</td>
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<tr>
<td>D6: Lead or support food and drink operational teams with machinery change overs and set ups.</td>
<td>K1, K2, K3, K4, K5, K6, K7, K8, K9, K10, K11, K12, K14, K15, K16, K17, K18, K19, K20, K22, K24, K27, K28, K29, K30, K31, K32, K33, K34, K35, K36, K37, K38, K44, K45, K47, K48, K49</td>
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<tr>
<td>D7: Manufacture and repair component parts for food and drink processing and packaging equipment.</td>
<td>K2, K8, K9, K11, K12, K14, K15, K16, K17, K18, K19, K22, K25, K26</td>
<td>S1, S3, S4, S5, S6, S7, S8, S18, S19, S21, S24</td>
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<td>D8: Contribute to continuous improvement projects to optimise food and drink equipment or process. For example, participate in failure investigations to ensure process effectiveness and to contribute to and implement practical engineering solutions for efficiency and profitability.</td>
<td>K2, K3, K4, K5, K6, K8, K9, K11, K12, K13, K15, K18, K19, K20, K28, K29, K30, K31, K32, K33, K34, K35, K36, K37, K38, K39, K40, K41, K45, K47, K48, K49</td>
<td>S1, S4, S5, S6, S17, S20, S21, S22, S23, S26, S28, S29, S30</td>
<td>B1, B2, B3, B4, B5, B7</td>
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<tr>
<td>D9: Remove and decommission food and drink processing and packaging equipment.</td>
<td>K1, K2, K6, K8, K9, K10, K11, K12, K14, K15, K16, K17, K18, K19, K24, K27, K28, K29, K30, K31, K32, K33, K34, K35, K36, K37</td>
<td>S1, S3, S4, S5, S6, S7, S8, S9, S16, S24</td>
<td>B1, B2, B3, B4, B7</td>
</tr>
<tr>
<td>D10: Contribute to the installation and commission food and drink processing and packaging equipment in line with food science and safety principles.</td>
<td>K1, K2, K3, K4, K5, K6, K7, K8, K9, K10, K11, K12, K13, K14, K15, K16, K17, K18, K19, K22, K24, K25, K26, K27, K28, K29, K30, K31, K32, K33, K34, K35, K36, K37, K38</td>
<td>S1, S3, S4, S5, S6, S7, S8, S9, S13, S14, S15, S19, S24</td>
<td>B1, B2, B3, B4, B7</td>
</tr>
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<td>D11: Contribute to technical performance reviews in collaboration with other functions and stakeholders.</td>
<td>K1, K2, K3, K4, K5, K7, K8, K9, K11, K12, K13, K15, K17, K18, K19, K21, K23, K24, K26, K27, K28, K29, K30, K31, K32, K33, K34, K35, K36, K37, K38, K39, K40, K41, K45, K46, K47, K48, K49</td>
<td>S1, S4, S5, S6, S17, S20, S22, S26, S28, S29, S30</td>
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<tr>
<td>D12: Maintain engineering documentation for food and drink maintenance work.</td>
<td>K1, K2, K3, K8, K9, K11, K16, K42, K43, K45, K46</td>
<td>S3, S4, S5, S6, S8, S21, S25, S26, S27, S29</td>
<td>B1, B2, B3, B4, B7</td>
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<tr>
<td>D13: Support maintenance and operational team members in developing engineering technical competence.</td>
<td>K2, K8, K9, K11, K45, K48, K49</td>
<td>S4, S5, S6, S26, S28, S30</td>
<td>B1, B2, B3, B4, B5, B7</td>
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<tr>
<td>D14: Ensure availability and performance of maintenance tools and equipment.</td>
<td>K2, K8, K9, K11, K14, K16, K44</td>
<td>S1, S4, S5, S6, S7, S8</td>
<td>B1, B2, B3, B4, B7</td>
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<tr>
<td>D15: Contribute to food and drink internal and external audits.</td>
<td>K1, K2, K3, K8, K9, K11, K45, K46</td>
<td>S1, S4, S5, S6, S26, S28, S29</td>
<td>B1, B2, B3, B4, B5, B6, B7</td>
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</table>
Knowledge


K3: Principles of quality management systems and processes in the food and drink industry and impact on customer requirements. Customer and food trade association standards for example, British Retail Consortium, Retailer standards. Internal and external audits and impact on maintenance.

K4: Food science and technology - fundamentals of how engineering is used in food and drink production: aseptic filling and processing, chilling, freezing, heat processing, modified atmosphere packaging (MAP), preservation, and packaging.

K5: Food safety regulations awareness and their impact on food and drink engineering: Food Safety Act, Hazard Analysis and Critical Control Points (HACCP), Threat Analysis of Critical Control Points (TACCP), and Vulnerability Assessment of Critical Control Points (VACCP).

K6: Food safety: control of contamination hazards (microbiological, physical, and chemical). The risk of contamination and impact on product integrity and health of consumers. Allergens. The importance and impact of temperature and process control measures. Regulatory information and date code responsibilities. Hygienic engineering design of food premises and equipment, and hygiene requirements of operators. Cleaning and disinfection principles, procedures, and methods: Cleaning in place (CIP), cleaning out of place, and chemical impact. Pest control.

K7: Properties of food and drink, packaging materials and scaling techniques and impact on engineering tasks.


K9: Health and safety practice: risk assessments and method statements, manual handling, Personal Protective Equipment (PPE), and signage and barriers.

K10: Safe isolation of process fluids, gases, electricity, and stored energy: Lockout, tagout (LOTO).


K12: Types of food and drink equipment and their application: pumps, valves, gauges, temperature controls, mixers, conveyors, depositors, sealers, safety systems, pressure systems and transmitters, human machine interface, and handheld devices. The importance of set points.

K13: Spares and services considerations: availability, stock lead times, correct handling, the identification of equipment and parts, function and specification of parts, spares, and components, stock value, faulty stock, returns, salvageability of parts to be removed.

K14: Maintenance tools: selection, correct use, maintenance, storage requirements. Restrictions in food and drink industry and designated areas.

K15: Engineering standards and regulations awareness and their application to food and drink engineering: British Standards (BS), International Organisation for Standardisation standards (ISO), European Norm (EN), and Atmospheres and Explosives (ATEX). Manufacturers’ manuals: what they are and how to use them.

K16: Standard operating and quality assurance procedures (SOP): what they are and how to use them.

K17: British standards for engineering representations, drawings, and graphical information.

K18: Engineering mathematical and scientific principles: calculations, conversions, and equipment sizing and dimensions.

K19: Engineering materials and their properties: impact on use in a food environment (food safe).

K20: Maintenance strategies and best practice: run to failure (breakdown maintenance), preventive (scheduled) maintenance, Predictive Maintenance (PdM), and Reliability Centered Maintenance (RCM).

K21: Reliability techniques - critical tools: condition monitoring, oil sampling, thermography, vibration analysis, and ultrasound. How they are used to reduce breakdowns, failures, and operational losses.

K22: Food safety engineering: food grade oils, greases, cleaning fluids, and safe use of tools and equipment.

K23: Equipment performance measures: data and how to use it. Terminology: mean time between failure, and overall equipment effectiveness (availability).

K24: Mechanical principles. Types of mechanical drives, belts, chains, and gears: alignment, and how to identify wear. Types of bearings: application, alignment, and fit.

K25: Principles of down-hand (flat) TIG (Tungsten Inert Gas) welding techniques in food environment: butt and tee. Awareness of MMA (Manual Metal Arc) and MIG (Metal Inert Gas).
Knowledge, skills and behaviours (continued)

welding practices and when they need to be used.
K26: Component manufacturing uses and requirements. Turning and milling, grinding, drilling, bench fitting techniques. Preparation for the food and drink environment. Threads, fit, finish, joining techniques, measurement and tolerance, and material selection considerations.
K27: Pneumatic and hydraulic system principles: transfer of energy inside fluid power systems in the food and drink industry.
K28: Basic engineering theory and thermodynamic principles on heat transfer used in the food and drink industry: how it works and maintenance requirements.
K30: Control circuits principles. Basic components (switches, relays, contactors, overloads, circuit breakers), power supplies, and calibration.
K31: Safety circuits: safety system categories, safety system architecture and components, characteristics of safety system components. What they do and why they are important (legality and performance).
K32: Types of motors and control systems and how they work: mechanical and electrical properties, programming of variable speed drives and parameters, soft starts.
K33: Electrical instrumentation and control installation, commissioning and decommissioning practices and techniques to standards required for food and drink industry. Ingress Protection (IP) and ATEX ratings. Testing and fault finding approved instrument requirements. Arc flash protection requirements.
K35: Types of Programmable Logic Controllers (PLC). How they work, system maintenance and architecture. Digital, analogue inputs, outputs, and IOT. Hardware interface and field wiring.
K37: Awareness of services and utilities in the context of food safety importance and impact: water supply and systems, boiler control, electrical distribution system, air compressors, steam boilers, refrigeration system, building management, ventilation and air conditioning (HVAC) controls, access control systems, effluent and waste, and chilled water systems.
K38: Principles of factory digitalisation (Industry 4.0).
K39: Problem solving techniques: root cause analysis, 6 thinking hats, DMAIC (Define, Measure, Analyse, Improve, Control), and PDCA (Plan Do Check Act).
K40: Fault finding techniques: root cause analysis, 5 Whys, fishbone, and half-split. Diagnostic tools and equipment.
K41: Continuous improvement techniques: lean, 6-sigma, KAIZEN, 5S (Sort, set, shine, standardise and sustain), and SMED (Single-Minute Exchange of Dies).
K43: Maintenance work recording and documentation requirements.
K44: Organisation techniques: planning, time management, workflow, and work scheduling and prioritisation.
K47: Team working techniques: how to work as part of a team, understanding the importance of establishing and meeting the requirements of different roles.
K48: Workplace training and buddy techniques: how to pass on knowledge and skills to others.
K49: Equality, diversity, and inclusion in the workplace: what it means and why it is important.

Skills
S1: Read and interpret task related information and data. For example, work instructions, SOPs, quality control documentation, Service Level Agreements, specifications, engineering representations, drawings, and graphical information, work instructions, and operation manuals.
S2: Plan work. Identify and organise resources to complete tasks.
S3: Identify hazards and control measures to mitigate risks.
S4: Comply with food safety regulations and procedures.
S5: Comply with health and safety regulations and procedures.
S6: Comply with environment and sustainability regulations and procedures: safe disposal of waste, re-cycling or re-use of materials and efficient use of resources.
S7: Select, check the condition, and safely use maintenance tools and equipment. Store tools and equipment. Complete or arrange maintenance of tools and equipment including calibration where required.
S8: Follow standard operating procedures and quality procedures.
S9: Follow site isolation and lock off procedures (lockout, tagout) and re-instatement of equipment with system checks and handover.
S10: Apply mechanical and fluid power system maintenance practices and techniques. For example, check levels, parts wear, pressure, and sensors, grease and lubricate parts, replace, fit components, and calibrate equipment.
S11: Apply electrical and control maintenance practices and techniques including use of electrical testing equipment and instruments. For example, panel risk assessment, fixed wire installation testing, fault finding, thermographic surveys, and checking protection settings.
S12: Apply reliability engineering techniques to prevent or reduce the likelihood or frequency
of failures. For example, condition monitoring, oil sampling, thermography, vibration analysis, and ultrasound.

S13: Install and configure instrumentation or process control systems.
S14: Install and configure electrical systems. For example, add distribution boards to circuits, single and three phase motors (AC and DC).
S15: Assemble, position and fix equipment or components. Complete commissioning checks.
S16: Disconnect and remove equipment or components. Complete storage measures to prevent deterioration.
S17: Read and interpret equipment performance data.
S18: Fabricate, drill, and join to produce basic parts, spares or components to measurement and tolerance specification.
S19: Apply down-hand (flat) TIG welding techniques: butt and tee.
S20: Apply mathematical techniques to solve engineering problems.
S21: Produce and amend electrical and mechanical engineering representations, drawings, and graphical information. For example, for new component parts or change in circuit diagram or panel.
S22: Apply fault-finding and problem-solving techniques for example, using PLC data to diagnose issues and locate faults on industrial network.
S23: Apply continuous improvement techniques to understand current performance; collect and record data. Devise suggestions for improvement.
S24: Restore the work area on completion of activity.
S25: Resolve or escalate issues.
S26: Use information technology. For example, for document creation, communication, and information management. Comply with GDPR. Comply with cyber security.
S27: Record work activity. For example, asset management records, work sheets, checklists, waste environmental records, and any business or legal reporting requirements.
S28: Communicate verbal and written. For example, with colleagues and stakeholders. Use engineering terminology where appropriate.
S29: Produce reports for example, equipment performance reports.
S30: Provide guidance or training to colleagues or stakeholders.

Behaviours
B1: Prioritise health and safety, food safety, and the environment and sustainability.
B2: Promote health and safety, food safety, and the environment and sustainability.
B3: Take ownership for own work and accountability for quality of work.
B4: Apply a professional approach.
B5: Team-focus to meet work goals: respectful to others, builds relationship with others, and positive inclusion.
B6: Respond and adapt to work demands.

B7: Committed to Continued Professional Development (CPD) to maintain and enhance their competence.
<table>
<thead>
<tr>
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## Qualifications

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<tbody>
<tr>
<td>Diploma in food and drink engineering maintenance: City &amp; Guilds Diploma in food and drink engineering maintenance, or OAL Diploma in food and drink engineering maintenance</td>
<td>Hard sift</td>
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<tr>
<td>Level: 3</td>
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<tr>
<td>Type: Type 2 off-the-job qualification</td>
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<tr>
<td>Ofqual regulated: Yes</td>
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<tr>
<td>Awarding bodies</td>
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</table>
Entry requirements

Typically, 5 GCSEs including English grade 4 (C) and mathematics grade 6 (B), or equivalent.

Professional recognition

<table>
<thead>
<tr>
<th>Professional body</th>
<th>Level</th>
<th>Full or partial recognition</th>
<th>What further requirements are needed for full recognition</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Institution of Engineering and Technology</td>
<td>Engineering Technician (Eng.Tech)</td>
<td>Full</td>
<td>—</td>
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<tr>
<td>The Institution of Mechanical Engineers</td>
<td>Engineering Technician (EngTech)</td>
<td>Full</td>
<td>—</td>
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Progression routes

ST0624: L5: Food and drink engineer
ST0529: L6: Food and drink advanced engineer (integrated degree)

Notice period

30 days

Notice period comments

Training providers and end-point assessment organisations have been kept informed of planned changes during the revision process and thus have had opportunity to prepare for the new version. Employers are keen to enrol Autumn 22 cohorts onto the new apprenticeship due to issues with the current version.