



FOOD AND DRINK MAINTENANCE ENGINEER

Key information

Reference: ST0195

Version: 1.1

Level: 3

Typical duration to gateway: 42 months

Typical EPA period: 3 months

Maximum funding: £26000

Route: Engineering and manufacturing

Date updated: 17/10/2022

Approved for delivery: 9 December 2014

Lars code: 16

EQA provider: Ofqual

Example progression routes:

Food and drink advanced engineer (integrated degree)

Review: This apprenticeship standard will be reviewed after three years

Contents

Details of the occupational standard

Occupation 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 predictive 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 include:

Food and drink maintenance engineer

Food and drink multi-skilled engineer

Entry requirements

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

Occupation duties

DUTY	KSBS
Duty 1 Prepare for food and drink maintenance work.	<p>K1 K2 K8 K9 K11 K13 K14 K15 K16 K17 K18 K19 K20 K22 K42 K44 K45 K47</p> <p>S1 S2 S3 S4 S5 S6 S7 S9 S26 S28 S29</p> <p>B1 B2 B3 B4 B5 B6 B7</p>
Duty 2 Conduct planned maintenance of food and drink processing and packaging equipment.	<p>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</p> <p>S1 S3 S4 S5 S6 S7 S8 S9 S10 S11 S13 S17 S24</p> <p>B1 B2 B3 B4 B7</p>
Duty 3 Conduct predictive maintenance of food and drink processing and packaging equipment (condition based monitoring).	<p>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</p> <p>S1 S3 S4 S5 S6 S7 S8 S9 S10 S11 S12 S13 S17 S24</p> <p>B1 B2 B3 B4 B7</p>
Duty 4 Respond to breakdowns of food and drink processing and packaging equipment. Conduct reactive maintenance or corrective actions to resolve deviation.	<p>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</p> <p>S1 S3 S4 S5 S6 S7 S8 S9 S10 S11 S17 S19 S20 S22 S24 S25</p> <p>B1 B2 B3 B4 B6 B7</p>

Duty 5 Identify faults (electrical, mechanical, instrumentation, automation and pneumatics) on food and drink processing and packaging equipment and action required.

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

S1 S3 S4 S5 S6 S7 S8 S9 S10 S11 S17 S20 S22 S24 S25

B1 B2 B3 B4 B6 B7

Duty 6 Lead or support food and drink operational teams with machinery change overs and set ups.

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

S1 S3 S4 S5 S6 S7 S8 S24 S28 S30

B1 B2 B3 B4 B5 B6 B7

Duty 7 Manufacture and repair component parts for food and drink processing and packaging equipment.

K2 K8 K9 K11 K12 K14 K15 K16 K17 K18 K19 K22 K25
K26

S1 S3 S4 S5 S6 S7 S8 S18 S19 S21 S24

B1 B2 B3 B4 B6 B7

Duty 8 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.

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

S1 S4 S5 S6 S17 S20 S21 S22 S23 S26 S28 S29 S30

B1 B2 B3 B4 B5 B7

Duty 9 Remove and decommission food and drink processing and packaging equipment.

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

S1 S3 S4 S5 S6 S7 S8 S9 S16 S24

B1 B2 B3 B4 B7

Duty 10 Contribute to the installation and commission food and drink processing and packaging equipment in line with food science and safety principles.

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

S1 S3 S4 S5 S6 S7 S8 S9 S13 S14 S15 S19 S24

B1 B2 B3 B4 B7

Duty 11 Contribute to technical performance reviews in collaboration with other functions and stakeholders.

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

S1 S4 S5 S6 S17 S20 S22 S26 S28 S29 S30

B1 B2 B3 B4 B5 B7

Duty 12 Maintain engineering documentation for food and drink maintenance work.

K1 K2 K3 K8 K9 K11 K16 K42 K43 K45 K46

S3 S4 S5 S6 S8 S21 S25 S26 S27 S29

B1 B2 B3 B4 B7

Duty 13 Support maintenance and operational team members in developing engineering technical competence.

K2 K8 K9 K11 K45 K48 K49

S4 S5 S6 S26 S28 S30

B1 B2 B3 B4 B5 B7

Duty 14 Ensure availability and performance of maintenance tools and equipment. K2 K8 K9 K11 K14 K16 K44

S1 S4 S5 S6 S7 S8

B1 B2 B3 B4 B7

Duty 15 Contribute to food and drink internal and external audits.

K1 K2 K3 K8 K9 K11 K45 K46

S1 S4 S5 S6 S26 S28 S29

B1 B2 B3 B4 B5 B6 B7

KSBs

Knowledge

K1: Food and drink sector awareness. The industry's regulator: The Food Standards Agency. Types of organisations: branded and non-branded, and high and low care sites. Types of food and drink products: ambient, frozen, fresh, chilled, confectionery, and liquid. End-to-end supply chain. Customers and consumers. Customer specifications: purpose and consequences of non-compliance. Implications of product shelf life.

K2: Food and drink maintenance engineer's role. Limits of autonomy. Different teams and functions involved in production. Business operation considerations: efficiency, customer satisfaction, competitiveness, minimising risks to production, and ethical practices.

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 sealing techniques and impact on engineering tasks.

K8: Health and safety regulations awareness and their application to food and drink engineering: Health and Safety at Work Act, Control of Substances Hazardous to Health (CoSHH), Working in confined spaces, Working at Height, Lone working, Provision of Work Equipment Regulations (PUWER), Lifting Operations and Lifting Equipment Regulations (LOLER), Dangerous Substances and Explosive Atmospheres (DSEAR), Pressure Equipment Directive (PED), Electricity at work regulations, Noise regulation, L8 Legionella, Display Screen Equipment, The Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (RIDDOR), and Construction Design Management regulations. Slips trips and falls. Types of incidents: fire, accidents, and near-misses. Mitigation methods. Incident management. Near miss reporting.

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).

K11: Environmental regulations and requirements awareness and their application to food and drink engineering. Environmental Protection Act. Sustainability. Waste Electrical and Electronic Equipment Directive (WEEE). Hazardous waste regulations. Waste management. Recyclable materials and waste disposal procedures. Energy monitoring. Data logging to optimise energy performance. The Climate Change Agreements. Carbon Reduction Commitment (CRC). Renewable and alternative energy sources. Energy reduction. Types of pollution and control measures: noise, smells, spills, and waste. Efficient use of resources. Environmental permits.

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) 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.

K29: Electrical principles. Basic electrical theory: LV (Low Voltage), HV (High Voltage), current, resistance, symbols and terminology. Electrical first aid. Alternating current (AC) and direct current (DC) systems. Testing equipment. Electrical circuit theory, electrical machines, electrical safety systems, and smart solutions.

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.

K34: Automation. Instrumentation and calibration techniques for systems: thermo, weights, and flow. Robotics and data acquisition (SCADA) and smart network systems. Communication systems: Profinet, Ethernet, Profibus, CANopen, and DeviceNet.

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.

K36: Sensors and motion control. Types of sensors and how they work: digital, analogue, pressure level, probes, inductive and smart. Encoders and position control: selection procedures.

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).

K42: Information technology: Management Information Systems (MIS), spreadsheets, presentation, word processing, email, virtual communication and learning platforms. General Data Protection Regulation (GDPR). Cyber security requirements.

K43: Maintenance work recording and documentation requirements.

K44: Organisation techniques: planning, time management, workflow, and work scheduling and prioritisation.

K45: Communication techniques: verbal, written, and electronic. Adapting style to audience. Engineering terminology.

K46: Report writing techniques.

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 buddying 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.

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.

Other mandatory qualifications

Diploma in food and drink engineering maintenance

Level: 3

Ofqual regulated

Professional recognition

This standard aligns with the following professional recognition:

- The Institution of Engineering and Technology for Engineering Technician (EngTech). The experience gained and responsibility held by the apprentice on completion of the apprenticeship will either wholly or partially satisfy the requirements for registration at this level.
- The Institution of Mechanical Engineers for Engineering Technician (EngTech). The experience gained and responsibility held by the apprentice on completion of the apprenticeship will either wholly or partially satisfy the requirements for registration at this level.

Version log

Version	Change detail	Earliest start date	Latest start date	Latest end date
1.1	Funding, standard and end-point assessment plan revised	04/07/2022	Not set	Not set
1.0	Approved for delivery	09/12/2014	03/07/2022	Not set

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