Institute for Apprenticeships & Technical Education

COMPOSITES TECHNICIAN

Key information

Reference: ST0094
Version: 1.1
Level: 3
Typical duration to gateway: 36 months
Typical EPA period: 3 months
Maximum funding: £20000
Route: Engineering and manufacturing

Date updated: 14/03/2023
Approved for delivery: 16 February 2017
Lars code: 160
EQA provider: Ofqual
Review: This apprenticeship standard will be reviewed after three years

Details of the occupational standard

Occupation summary

Composite technicians work in the process manufacturing sector.

Composite components are used in the aerospace, automotive, construction, furniture, marine, medical, motorsport, oil and gas, rail, and renewables industries and many more. Composite products include doors, prosthetic limbs, shower trays, and tennis rackets.

Composites combine polymeric resins (plastics) and a reinforcing material such as carbon fibre, glass fibre, or Kevlar to produce a material with improved properties. For example, increased strength or stiffness without significantly increasing the weight.

Composite technicians produce polymer matrix composite (thermoset and thermoplastics) components or final products to a specification. They may combine the composite elements or use a pre-prepared material to produce the product using a variety of moulding processes. The processes require manual dexterity and skills. Production tends to be in batches and conducted in small-scale production facilities. Quality and process control is part of the role. They conduct quality assurance processes, check equipment and tooling for future usability, complete documentation, and participate in improvement activities.

They work with other members of the manufacturing team. They also have contact with other functions for example, process engineers, maintenance engineers, laboratory staff, supply chain staff, and warehouse staff. They may also have contact with external people such as customers, service providers, suppliers, and regulators.

They must ensure that the process and products meet quality specifications and are produced to schedule. They must comply with health and safety, regulations and procedures including wearing personal protection equipment (PPE). They also need to meet environmental and sustainability regulations and procedures – minimising waste and recycling materials. They may work alone or

as part of a team with minimal supervision. They are responsible for the quality and accuracy of their own work.

Typical job titles include:

- Composites laminator
- Composites materials technician
- Composites technician
- Composites tooling technician

Occupation duties

DUTY	KSBS
Duty 1 Complete composite pre-processing activities. For example, organise and prepare mould tools and materials.	K1 K2 K3 K4 K5 K6 K7 K8 K9 K10 K11 K12 K13 K14 K15 K16 K18 K19 K20 K21 K22 K26 K37 S1 S2 S4 S5 S6 S7 S8 S9 S12 S18 S24 B1 B2 B3 B4 B5 B6
Duty 2 Conduct composite processing activities following technical instructions.	K1 K2 K3 K4 K5 K6 K7 K8 K9 K10 K11 K12 K13 K14 K15 K16 K17 K18 K19 K20 K22 K23 K25 K26 K37 S1 S2 S4 S5 S6 S9 S11 S12 S13 S14 S15 S18 S24 B1 B2 B3 B4 B5 B6
Duty 3 Complete quality assurance processes. For example, conduct grading parameters checks (size, appearance, weight), and take samples for laboratory testing.	K1 K2 K3 K4 K5 K6 K8 K11 K12 K13 K16 K18 K20 K24 K26 K27 K28 K30 K33 K37 S1 S2 S4 S5 S6 S12 S16 S17 S18 S20 S21 S22 S24 B1 B2 B3 B4 B5 B6
Duty 4 Check the composite processing equipment and tooling for future usability; make repairs or escalate.	K1 K2 K3 K4 K5 K6 K16 K18 K21 K22 K26 K33 K37 S1 S4 S5 S6 S8 S18 S20 S22 S24 S25 B1 B2 B3 B4 B5 B6
Duty 5 Complete process manufacturing documentation - digital or paper based. For example, process and production records, traceability records, quality assurance records.	K1 K2 K3 K4 K5 K6 K26 K29 K33 K34 K35 S1 S4 S5 S20 S26 S27 B1 B2 B3 B4 B5 B6
Duty 6 Conduct handover responsibilities - providing information to or receiving information from other shifts or maintenance teams.	K2 K3 K4 K5 K6 K26 K33 K34 K35 K36 K37 S1 S4 S5 S18 S20 S24 S25 S26 S27 B1 B2 B3 B4 B5 B6

Duty 7 Maintain the work area (housekeeping) following safety, environmental and risk management systems. Ensure waste is separated, segregated, and disposed of in accordance with environmental standards.	K2 K3 K4 K5 K6 K24 K26 S1 S2 S3 S4 S5 S6 S10 S18 S19 B1 B2 B3 B4 B5 B6
Duty 8 Participate in continuous improvement activities. For example, ways to contribute to achieving Net Carbon zero by focussing on reduction of unnecessary energy use and waste.	K2 K3 K4 K5 K6 K19 K20 K24 K27 K31 K32 K33 K34 K35 K36 S1 S2 S4 S5 S6 S18 S20 S22 S23 S24 S25 S26 S27 S28 B1 B2 B3 B4 B5 B6 B7
Duty 9 Participate in risk assessment activities.	K2 K3 K4 K5 K6 K34 K35 K36 S1 S3 S4 S5 S18 S20 S24 S25 S26 S27 B1 B2 B3 B4 B5 B6

KSBs

Knowledge

K1: Composite industry awareness. Range of composite products. Manufacturing environments. Types of customers.

K2: Composite technician's role. Limits of responsibility. Escalation procedures.

K3: Health and safety regulations and standards awareness. Control of Substances Hazardous to Health (COSHH). Display Screen Equipment. Electrical safety and compliance. Fire safety. Hand arm vibration (HAVS). Health and Safety at Work Act – responsibilities. Human factors, ergonomics. Legionella. Lifting Operations and Lifting Equipment Regulations (LOLER). Lone working. Manual handling. Noise regulation. Provision and Use of Work Equipment Regulations (PUWER). Slips trips and falls. The Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (RIDDOR). Working at Height. Working in Confined Spaces.

K4: Health and safety practice. Risk assessment and risk mitigation in composites process manufacturing environment. Personal protective equipment (PPE) requirements: selection, inspection, operation, wearing, and disposal.

K5: Environmental and sustainability regulations and guidance. Environmental hazards that can arise from composite operations. Environmental management systems standard. Environmental Protection Act. Environmental signage and notices.

K6: Principles of sustainability and circular economy. Energy efficiency and reuse of materials. Recycling procedures. Principles of control and management of emissions and waste.

K7: Definition of a composite. Interaction between resin and fibre. Types of core. Benefits of adding core. Advantages and disadvantages of composites.

K8: The characteristics of finished composite products and their various applications.

K9: The difference between thermoset and thermoplastics: mechanical and thermal benefits, processing requirements, and re-cycling potential.

K10: Types of reinforcement materials: aramid, carbon, glass, natural fibres, and thermoplastic fibres; processing, cost, performance, benefits, and limitations.

K11: Types of matrix materials: bismaleimide, cyanate ester, epoxy, phenolic, polyester, vinylester, and bio-derived: processing, cost, performance, benefits, and limitations.

K12: The manufacture of materials: chopped strand mat, non-crimp fabrics, pre-impregnated, preforms, unidirectional, and woven reinforcements. Different weave styles: plain, satin and twill; impact on drape and mechanical properties.

K13: Composite process materials and consumables: peel plies, release agents, release films, sealant tapes, and vacuum bag; application and benefits of use.

K14: Hand lay-up techniques: open moulding, spray lay-up, and pre-impregnated. Resin infusion, resin transfer moulding, and closed moulding using vacuum techniques.

K15: Awareness of automated lay-up: automated fibre placement, automated tape layup, braiding, and filament winding.

K16: Plant, equipment, machinery, and hand tools used within composites manufacture: application and operation.

K17: The curing cycle. Glass transition temperature (Tg). The science of pressure and vacuum.

K18: Principles of process control and instrument control methodology.

K19: Awareness of application of digital systems to support manufacture: CAD (computer-aided design), CAM (computer-aided manufacturing), CMM (coordinate measuring machine), and additive manufacture.

K20: Composite tooling and product design process awareness.

K21: Composite mould tool manufacture methods, techniques, and considerations.

K22: Composite mould tool preparation and operation.

K23: Composite manufacture processes and principles: moulding, laminating, and curing.

K24: Process risk in composite manufacture and mitigation. Defect types and causes.

K25: Composite repair techniques: step, scarf, gel, resin injection, and riveting.

K26: Standard operating procedures, drawings, and work instructions: what are they, why they are important.

K27: Quality, cost, and delivery (QCD) standards and their importance in the workplace.

K28: Quality assurance, testing and inspection methods.

K29: Documentation requirements.

K30: Awareness of audits and their purpose.

K31: Problem solving: root cause analysis, 5-Whys.

K32: Continuous improvement (CI) techniques: lean, 6-sigma, KAIZEN, and 5S.

K33: Information technology. Management information systems, word processing, spreadsheet, email, virtual learning platforms, document sharing platforms. General data protection regulation (GDPR). Cyber security.

K34: Verbal communication techniques. Composite industry terminology.

K35: Written communication techniques.

K36: Principles of team working. Equality, diversity and inclusion.

K37: Planning, prioritising, and time management techniques.

Skills

S1: Review drawings, instructions, or information to understand task.

S2: Plan work. Identify and organise resources.

S3: Identify hazards and risks in the workplace.

S4: Apply health and safety procedures in compliance with regulations and standards.

S5: Apply environmental and sustainability procedures in compliance with regulations and standards.

S6: Apply sustainability principles for example, in choice of materials, minimising waste.

S7: Prepare and use mould tools.

S8: Select and check hand tools, equipment and machinery including calibration record.

S9: Use or operate hand tools, equipment, and machinery.

S10: Store mould tools, hand tools, and equipment.

S11: Select, check, and prepare materials for example, weigh resins, cut reinforcement.

S12: Follow quality control processes during manufacture for example, check for contaminants, record batch numbers or expiry dates.

S13: Apply laminate to mould for example, cut, add darts, corner definition, orientation, position, and order.

S14: Complete preparation for and start curing process for example, select and apply consumables for example vacuum bag, infuse with resin, add heat or pressure.

S15: Extract product from mould (break out).

S16: Conduct final product quality assurance procedure. For example, conduct grading parameters checks (size, appearance, weight), and take samples for laboratory testing.

S17: Identify issues for example, de-laminations, inclusions, surface defects, surface imperfections, and maintenance requirements.

S18: Escalate issues outside limits of responsibility.

S19: Segregate resources for reuse, recycling, and disposal.

S20: Record or enter data - paper based or electronic. For example, process and production records, traceability records, and quality assurance records.

S21: Interpret data for example, defect data and geometrical measurements. Use data to validate suggestions.

S22: Investigate a problem to identify the underlying cause. Identify a solution to the problem.

S23: Apply continuous improvement techniques. Devise suggestions for improvement. For example, improving the energy consumption or waste profile of processes and procedures to improve the sustainability or carbon footprint of a product, process, or task.

S24: Apply team working principles.

S25: Communicate with others verbally for example, colleagues and stakeholders.

S26: Communicate in written form in the workplace for example, handover notes or emails, non-conformances, design change requests.

S27: Use information technology for work tasks. Comply with GDPR and cyber security regulations and policies.

S28: Plan how to meet personal development needs. Carry out and record planned and unplanned continued professional development (CPD) activities. Evaluate CPD against plans made.

Behaviours

B1: Prioritise health and safety.

B2: Consider the environment and sustainability.

B3: Demonstrate professional integrity.

B4: Take responsibility for the quality of work.

B5: Team-focus with commitment to inclusivity.

B6: Respond and adapt to work demands or situations.

B7: Committed to continued professional development.

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.

Professional recognition

This standard aligns with the following professional recognition:

- The Institute of Materials, Minerals and Mining for Engineering Technician (EngTech)

Version log

Version	Change detail	Earliest start date	Latest start date	Latest end date
1.1	End-point assessment plan and funding revised	14/03/2023	Not set	Not set
1.0	Approved for delivery	16/02/2017	13/03/2023	Not set