Apprenticeship Standard – Glass Manufacturing Operator

Occupations: Glass is an integral part of people's everyday lives. The UK Glass manufacturing industry has three main sectors; Container, Flat and Fibre, which produce a range of products from bottles and windows through to construction materials and fibre for wind turbines.

Glass manufacturing operators primarily assist in the smooth running of day to day operations in the glass making process. Dependant on the specific role, operators may work upon a diverse range of machinery, plant and equipment. In this role they can expect to work under supervision or where appropriate on their own initiative. Duties are expected to include;

- Maintenance of equipment to maintain the upkeep of the manufacturing process
- Diagnosis of faults in the process and following rectification procedures
- Conducting scheduled safety inspections and resolving any issues that may arise

The nature of the industry presents challenges such as working in hot conditions and in fast paced environments. This requires a diverse blend of manual skills, underpinning industry knowledge and the disciplines required for environmental and safe working practices.
There are three main job roles;

- Batch and Furnace Operator (Flat Glass / Container Glass)
- Hot End Machine Operator (Container Glass)
- Flat Glass Process Operator (Flat)

All apprentices must complete the mandatory core elements of the glass manufacturing operator's apprenticeship. Dependant on the industry and job role the apprentice must then complete the specific requirements specified for that role.

Core Knowledge:

- Understanding of basic glass chemical composition and how this can be changed to meet customer requirements.
- Knowledge of the UK glass industry including; market sectors, industry size and competitors.
- Ability to recognise the most commonly used glass manufacturing processes.
- Appreciation of future glass innovations and how these can impact the manufacturing process.
- Current health and safety requirements in the glass manufacturing industry, including manual handling, personal protective equipment and working to correct standard operating procedures.
- Knowledge of working in a hot environment, and compliance with the appropriate safety and environmental systems.
- Understanding of the need for high quality standards within the glass industry in relation to the end user of the products.
- Knowledge of the environmental restrictions glass manufacturers have to adhere to. For example, CO2 and recycling regulations.
- Knowledge of the common glass faults specific to your sector.
- Knowledge of your company's standard operating procedures and how to meet their requirements.
- Understanding of the business environment in which your business operates and your personal role and relationship with internal customers.

Core Skills:

- The ability to use the IT systems used to control the automation of key equipment applicable to your job role.
- Comply with workplace health and safety and housekeeping practices.
- The ability to analyse and interpret technical data from different sources, such as production and maintenance data.
- Understanding of the principles of lean manufacturing and how to implement basic lean tools.
- Carry out basic IT operations such as development and editing of production schedules or inventory reports.
- The ability to carry out basic maintenance tasks to minimise production downtime.

Core Behaviours:

- **Safety mind-set**: This occupation sits within an industry with a high level of safety critical activities. There has to be strict compliance and a disciplined and responsible approach to manage, mitigate and avoid risk.
- **Quality focus**: Follows rules, procedures and principles in ensuring work completed is fit for purpose and pays attention to detail / error checks throughout activities.
- **Good Time Management**: Ability to prioritise main tasks, work to a schedule and meet deadlines.
- **Clear communicator**: Uses a variety of appropriate communication methods to give/receive information accurately, and in a timely and positive manner.
- **Problem solving orientation**: Identifies issues quickly, motivated to solve complex problems and applies appropriate solutions. Has a strong desire to push to ensure the true root cause of any problem is found and a solution identified which prevents further recurrence.
- **Self-starter**: always does their best, motivated to succeed, accountable and persistent to complete a task.
- **Willingness to learn**: wants to drive their continuous professional development.
- **Perform under pressure:** Ability to work in a challenging and fast-paced environment.

Specific Requirements for each Job Role

Batch and Furnace Operator: A Batch and Furnace Operator's main role is to ensure the safe and effective running of the batch and furnace operation. The role includes the timely delivery of raw materials to the furnace and delivery of glass to the forming process. They have knowledge of glass chemistry, furnace and melting technology along with proficient use of the user operating systems.

Skills: A Batch and Furnace Operator must be able to;

- Carry out relevant visual inspection duties of Batch and Furnace areas, to make sure they comply with relevant health and safety regulations and meet maintenance standards.
- Perform manual checks of batch and glass levels to ensure the calibration of computer equipment.
- Undertake hot repairs and maintenance procedures so that equipment meets requirements for operation. This will require the operator to ensure they follow the correct procedure and wear necessary personal protective equipment.
- Optimise the emissions and efficiency of the furnace, to meet and exceed industry regulations
- Recognise emergency situations and follow rectification procedures.
- Manually operate process in the Batch and Furnace operation, making sure raw materials are delivered in a safe and timely manner if automated process is unavailable.

Knowledge: A Batch and Furnace Operator must have an understanding of:

- Delivery and storage requirement procedures of raw materials used in the process.
- The correct batch specifications for different glass types that are produced in their sector.
- Control of automated batch process including mixing and weighing processes.
- The glass conditioning process.
- Basic glass chemistry and melting, including; compositional changes and batch pattern control.
- Furnace design types and different structures available.
- The range of furnace fuels available and how they affect the melting process in the furnace.
- Combustion set up, flame geometry, gas firing cycle, future fuel innovations.
- Environmental implications related to the batch and furnace operation.
- Measurement and assessment of glass quality: glass colour, density, inclusions.

Hot End Machine Operator (Also known as IS operator): A Hot End Machine Operator's main role is to ensure the smooth running of an IS machine (Individual Section machine) used for the formation of a glass containers in a safe and effective manner. A Hot End Machine Operator is responsible for keeping containers within quality parameters, basic maintenance procedures and delivering containers to the next stage of the process. Hot End Machine Operators will have knowledge of the container forming process along with excellent understand of container faults and rectification procedures.

Skills: A Hot End Machine Operator must be able to;

- Change mould equipment in line with health and safety regulations.
- Perform manual checks of containers in line with quality procedures.
- Handle containers correctly and ensure successful transportation to the following process (Lehr).
- Carry out regular lubrication of machines (swabbing) in line with health and safety regulations.
- Control multiple sections of an IS machine simultaneously, checking that safety and quality procedures are adhered to.

Knowledge: A Hot End Machine Operator must have an understanding of;

- The container forming processes and sequence of events.
- The key mechanical parts and tooling on an IS machine.
- Operating system of an IS machine and how to change timings.
- Container fault identification and how to rectify the issues following company's policies.
- Delivery equipment and Gob (a lump of molten glass used to make a piece of glassware) formation.
- Container surface treatments and coatings and how these affect the production of containers.
- The glass conditioning process.

Flat Glass Process Operator: A Flat Glass Process Operator's role is to ensure the safe and effective running of the float glass process for the production of flat glass. A flat glass process operator must have knowledge of each stage of the manufacturing process and be able to work to strict quality standards.

Skills: A Flat Glass Process Operator must be able to;

- Carry out relevant visual inspection duties of manufacturing process, including batch and furnace areas, to make sure they comply with relevant health and safety regulations and meet maintenance standards.
- Undertake hot repairs and maintenance procedures so that equipment meets requirements for operation. This will require the operator to ensure they follow the correct procedure and wear necessary personal protective equipment.
- Measurement and assessment of glass quality: glass colour, density, inclusions.
- Recognise emergency situations and follow rectification procedures.
- Handle flat glass safely using correct procedures and equipment.

Knowledge: A Flat Glass Process Operator must have an understanding of;

- The float glassmaking process and all associated forming and annealing operations.
- Coatings and treatments used in the flat glass manufacturing process.
- Delivery and storage requirement procedures of raw materials used in the process.
- The correct batch specifications for different glass types that are produced in their sector.
- The glass conditioning process.
- Basic glass chemistry and melting, including compositional changes and batch pattern control.
- Basic understanding of furnace design types and different structures available.
- The range of furnace fuels available and how they affect the melting process in the furnace.
- Combustion set up, flame geometry, gas firing cycle, future fuel innovations.
- Environmental implications related to the batch and furnace operation.

Duration of Apprenticeship: This is dependent on the specific job role within the apprenticeship. The programme will typically take 30-36 months for an apprentice to complete the apprenticeship, dependent on prior experience.

Entry Requirements: Individual employers will set the selection criteria for their apprenticeships. Typically this will be the achievement of 3- 5 GCSE's at grade A*- C, including English, Mathematics and a Science, or equivalent qualifications. If not already achieved, apprentices will need to have completed level 2 English and maths prior to completion of their apprenticeship.

Professional Recognition: Completion of the Glass manufacturing operator apprenticeship will be recognised by the Institute of Materials, minerals and mining (IOM3) as the evidence required for Engineering Technician (EngTech) registration.

Level: This is a level 3 apprenticeship

Governance and Review Date: The apprenticeship standard will be reviewed after 3 years.