



## SCIENCE MANUFACTURING TECHNICIAN

## DIPLOMA IN POLYMER PROCESSING

Welcome to the

# SOLUTIONS 4 POLYMERS

# GUIDE TO APPRENTICESHIPS

**Our aim is to provide a skilled, technical workforce for the polymer processing operations industries that will enable them to compete in a global market.**

Solutions 4 Polymers Limited (S4PL) was formed to provide a cost-effective solution to company needs. We focus on providing polymer training and support solutions including Polymer Apprenticeships, technical support, within the sector to resolve problems and concerns.

Whether your need is for Injection moulding, Blow moulding, Extrusion thermoforming or a support area, we can help. The newly developed Level 3 Diploma qualification has been specifically created for the polymer sector, following detailed discussions with a wide range of across the UK.

Solutions 4 Polymers firmly believes that the Apprenticeship Standard should equip the individual with all the necessary knowledge, skills and behaviours to perform to the highest level possible in a modern manufacturing environment. We have strived to include additional skills development and associated occupational support knowledge to give your business the competitive edge.

**We look forward to working with you.**

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# Overview

## What is it?

This apprenticeship is aimed at both new and existing employees who work in any of the many processes in the Polymer processing industry and would benefit from a structured development to enable them to operate at a Technician level.

## How long does it take?

Typically, 18 to 30 months. This is dependant on the ability and time commitment of the apprentice, as well as the number of visits which can be made per month.

## What does it cover?

The technical skills and understanding for a particular or specific polymer process.

To ensure a well-rounded operative it also covers General Performance or Behavioural skills i.e. effective communications, teamwork, and management of change.

## Which qualifications are gained?

- PIABC Diploma in Polymer Processing (L3)
- IOSH Working Safely
- Functional Skills English and Maths (if not already held)

## How is it delivered?

S4PL provide continual training, support and assessment throughout the programme all undertaken within in the apprentice's workplace, using the company's equipment, materials and systems.

## End Point Assessment

This is a mandatory requirement for all standard apprenticeships where the apprentice is tested towards the end of the scheme to ensure that all aspects have been delivered to the correct standard. This is carried out by an external assessment organisation.

## What help can a company expect?

S4PL, together with The College of West Anglia have years of experience running polymer processing apprenticeships in a whole range of companies. They will guide the company from day one with identifying suitable apprentices, the choice of qualification options available, funding, identifying training and support needs.

## What can an apprentice expect?

- Full support along the way with a dedicated assessor who will be their main point of contact
- A company mentor
- Student memberships and discounts
- Outward bound trips organised by The College of West Anglia

## Professional Recognition

Throughout the duration of the apprenticeship, candidates are given student membership of IOM3 (Institute of Materials, Minerals and Mining). Upon completion, associate membership can be applied for by the apprentice, earning them the title of Registered Science Technician (RSciTech).

# BENEFITS OF APPRENTICESHIPS

## WHAT EMPLOYERS SAY

96% of employers with apprentices have experienced at least one benefit from taking on apprentices, and most can count at least 8 benefits.

74% of employers say that apprentices improved products or service quality, and 78% say that they improved productivity. Apprentices become highly skilled even before they finish their training.

67% of employers say that employing apprentices improved their image in the sector.

69% of employers say that employing apprentices improved staff retention. 65% of apprentices stay working for the company that trained them when they complete their apprenticeship.

73% of employers say that staff morale is improved by having apprentices.

86% of employers said that apprentices helped to develop relevant skills for the organisation, and to fill the skills gap.

## How to measure the benefits of apprenticeships

Measuring the impact of apprentices within your company does not have to be difficult or demanding. For instance, key performance indicators (KPIs) can be used to monitor apprentices' performance during their apprenticeship. The same indicators can be used to compare and contrast apprentices' performance with that of other staff as part of existing business processes.

## How can you evaluate the benefits of apprenticeships?

Regularly analysing the performance and outcomes of your apprentices will allow you to see the current and future benefits to your business. Your performance metrics will depend on what is important in your specific business context. For example,

If high staff turnover is an issue in your company, you could track the length of time that apprentices remain with the business. If you have a significant skills gap, you can monitor the percentage of unfilled roles in the company, and whether apprentices are promoted to fill these positions.

# DELIVERY

## **All delivery is undertaken at your site, on your machines, at a date and time to suit the needs of your business.**

This on-site approach has the following benefits over the alternative off-site delivery:

- No additional costs of travel and accommodation which are not fundable by the levy system
- Shift working can be catered for to minimise disruption to work rotas
- Opportunity for managers and the apprentices' colleagues to be involved in training sessions, in fact we encourage this
- Practical training, wherever possible, is carried out using company equipment, tooling and materials, for theory training, applications of topics e.g. quality systems can be examined using examples within the company
- Practical training will also include working with company products which may have specific quality, safety or confidentiality requirements which would not feature in more generalised off-site training
- The importance of safe, effective and efficient production procedures is a theme throughout, again company procedures can be used, including their evaluation and possible suggestions for improvement
- But it is people who are the key to successful production, apprentices will learn about the job roles of others and if possible, we suggest apprentices work for a short period in related departments e.g. Tool Room
- By having an S4PL trainer assessor regularly on-site the apprentice and the company have a single point of contact who is also available when not on site

The apprenticeship demands knowledge in a range of theory subjects as determined by the units in the Diploma in Polymer Processing Level 3 qualification. These subjects are delivered using a dedicated suite of presentations, and challenging classroom and shop floor activities.

In between visits apprentices will be given projects and objectives to undertake which not only reinforce knowledge and practical skills but can contribute to achieving the qualification.

Achievement of the apprenticeship is dependent on achievement of the Diploma in Polymer Processing Level 3 qualification. To reduce bureaucracy and to make the creation and gathering of evidence easier we have designed bespoke knowledge assignment templates that help apprentices provide evidence in an efficient and involving manner to meet the qualification's criteria.

Assessment for the Diploma in Polymer Processing Level 3 qualification is also carried out entirely on-site by the S4PL trainer assessor via continuous assessment of course work with a multiple-choice knowledge test.

The quality of training and assessment is closely monitored in two ways, by an S4PL qualified Internal Quality Assurer and The College of West Anglia quality monitoring visits, this also ensures compliance with regulatory requirements that are audited by outside organisations such as Ofsted.

**Our aim is not just to equip the apprentice for their current role, but to equip the apprentice with both the transferable and company specific knowledge and skills they need for a long career within the industry.**

# DIPLOMA IN POLYMER PROCESSING

This regulated qualification PIABC Level 3 Diploma in Polymer Processing has been designed for learners working in the polymer processing and related sectors. It covers knowledge of thermoplastic processing; technologies, methods and processes; polymer materials and their processing behaviour; engineering principles; health and safety; the environment; and quality and process management.

Learners then may choose one of five pathways which focus on specific processes within polymer processing (e.g. thermoplastic extrusion, injection moulding, preform blow moulding, Parison blow moulding and thermoplastic materials processing).

## AIM

This national qualification is primarily knowledge based and aims to provide industry specific knowledge appropriate for the day to day activities in a polymer processing environment, developing a sound understanding of the different types of processes and how they are processed and their uses. Those achieving the qualification will be able to apply this knowledge to identify a range of

product, material and processing issues and communicate technically with others. PIABC Level 3 Diploma in Polymer Processing is intended for those learners who will have worked in a polymer processing environment for approximately 3 to 9 months prior to starting.

## OUTCOMES

1. Provide and enhance the skills competency, knowledge and job satisfaction of learners - providing them with a means of progression to higher level job roles and qualifications.
2. Provide employers with an open and transparent basis for judging the suitability of learners for employment and promotion.
3. Facilitate job movement throughout the polymer processing industry and related sectors.

## TARGET GROUP

This Level 3 qualification is appropriate for those wanting to enhance their employment and progression opportunities in the polymer processing industry and related sectors. There are two broad target groups:

1. People within the polymer processing industry who want to extend their knowledge and skills to gain a recognised qualification.
2. People within the polymer processing industry who want to operate more professionally and effectively.

Due to the diverse nature of the polymer processing industry, it is difficult to define the target groups in terms of precise job functions. Typically, learners are likely to be in positions where they are responsible for functions such as setting up and troubleshooting a new product or process.

# PROCESS PATHWAYS

## EXTRUSION

### PA1 - Principles of Thermoplastic Extrusion

This knowledge-based unit introduces the learner to the process of extruding thermoplastic materials using different types or forms of extrudate e.g. profile, pipe, sheet, film, strand, etc.

The unit introduces the learner to the concepts and requirements to start, control and optimise a specific type of thermoplastic extrusion line. This includes typical systems and techniques for configuring the extrusion line, potential safety hazards and how they are managed, process considerations and parameters for a range of extrusion materials used with the extrusion process, how productivity and quality of the extrudate can be affected by the interaction of the range of process controls, etc.

It also investigates how to recognise and overcome thermoplastic extrusion processing and product faults by considering different strategies of fault finding, identifying extrusion process and product faults, their symptoms, possible causes relating them to the processing conditions and considering possible processing solutions.

### PA2 - Processing Thermoplastics by Extrusion

The key unit of the qualification where knowledge of safety, equipment, tooling, materials, engineering and quality come together in applying safe, logical and efficient procedures to set up the process.

This unit is delivered, wherever possible, using the company's own equipment to ensure learning relates to the real-life production environment. It covers safely mounting a mould, efficiently starting the moulding machine, initially stabilising the process by inputting suitable settings, identifying any process or product faults and their root causes and carrying out further adjustments to achieve the required quality and output.

The process is then optimised by using appropriate process capability studies, analysing the results and determining an effective plan for possible further improvements.

The learner will also recommend any modifications to the mould, downstream equipment or material specification to optimise and improve the process.

The unit will enable learners to carry out setting by applying a safe and logical approach to use routinely, on a daily-basis. Where a product fault or process problem occurs during production having the ability to gather information, identify the root cause and its possible remedies then logically apply changes to settings which can make a significant contribution to production performance.



# PROCESS PATHWAYS

## INJECTION MOULDING

### **PB1 – Principles of Thermoplastic Injection Moulding**

Covers the design features of injection moulding machines and designs of the range of moulds available including: - plasticising screws, nozzles, machine drive and control systems, the functions and features of a range of mould tools, hot and insulated runners, including their feed systems, gates and controls, pre-processing and downstream equipment and the range of secondary operations available.

Introduces the learner into the concepts and requirements to start, control and optimise an injection moulding machine including typical systems and techniques for configuring the production set-up. It covers the potential safety hazards and how they are managed, process considerations and parameters for a range of injection moulding materials, how productivity and quality can be affected by the interaction of the range of process controls, etc.

It also investigates how to recognise and overcome thermoplastic injection moulding processing and product faults by considering different strategies of fault finding, identifying injection moulding process and product faults, their symptoms, possible causes relating them to the processing conditions and considering possible processing solutions.

### **PB2 – Processing Thermoplastics by Injection Moulding**

The key unit of the qualification where knowledge of safety, equipment, tooling, materials, engineering and quality come together in applying safe, logical and efficient procedures to set up the process.

This unit is delivered, wherever possible, using the company's own equipment to ensure learning relates to the real-life production environment. It covers safely mounting a mould, efficiently starting the moulding machine, initially stabilising the process by inputting suitable settings, identifying any process or product faults and their root causes and carrying out further adjustments to achieve the required quality and output.

The process is then optimised by using appropriate process capability studies, analysing the results and determining an effective plan for possible further improvements.

The learner will also recommend any modifications to the mould, downstream equipment or material specification to optimise and improve the process.

The unit will enable learners to carry out setting by applying a safe and logical approach to use routinely on a daily-basis. Where a product fault or process problem occurs during production having the ability to gather information, identify the root cause and its possible remedies then logically apply changes to settings can make a significant contribution to production performance.

# PROCESS PATHWAYS

## PREFORM BLOW MOULDING

### **PC1 – Principles of Thermoplastic Preform Blow Moulding**

Investigates the needs and behaviour of a range of preform blow moulding materials during each stage of the process and looks at how process conditions affect the process and product, focusing on equipment function, design features, operational requirements and support services required.

The unit covers the design features of preform blow moulding machines and designs of the range of moulds available including: - machine layout, control systems, the functions and features of a range of mould tools, pre-processing and downstream equipment and the range of secondary operations available.

The unit introduces the learner into the concepts and requirements to start, control and optimise a preform blow moulding machine including typical systems and techniques for configuring the production set-up. It covers the potential safety hazards and how they are managed, process considerations and parameters for a range of preform blow moulding materials, how productivity and quality can be affected by the interaction of the range of process controls, etc.

It also investigates how to recognise and overcome preform blow moulding processing and product faults by considering different strategies of fault finding, preform blow moulding process and product faults, their symptoms, possible causes relating them to the processing conditions and considering possible processing solutions.

### **PC2 – Processing Thermoplastics by Preform Blow Moulding**

The key unit of the qualification where knowledge of safety, equipment, tooling, materials, engineering and quality come together in applying safe, logical and efficient procedures to set up the process.

This unit is delivered, wherever possible, using the company's own equipment to ensure learning relates to the real-life production environment. It covers safely mounting a mould, efficiently starting the moulding machine, initially stabilising the process by inputting suitable settings, identifying any process or product faults and their root causes and carrying out further adjustments to achieve the required quality and output.

The process is then optimised by using appropriate process capability studies, analysing the results and determining an effective plan for possible further improvements.

The learner will also recommend any modifications to the mould, downstream equipment or material specification to optimise and improve the process.

The unit will enable learners to carry out setting by applying a safe and logical approach to use routinely on a daily-basis. Where a product fault or process problem occurs during production having the ability to gather information, identify the root cause and its possible remedies then logically apply changes to settings can make a significant contribution to production performance.

# PROCESS PATHWAYS

## PARISON BLOW MOULDING

### PD1 – Principles of Thermoplastic Parison Blow Moulding

It investigates the needs and behaviour of a range of parison blow moulding materials during each stage of the process and looks at how process conditions affect the process and product, focusing on equipment function, design features, operational requirements and support services required for various parison blow moulding processes.

The unit covers the design features of a thermoplastic extruder and die designs available including; plasticising screws, head and parison dies and their configurations, methods of controlling extruder heating, multi-head and parison process control options, blow pins and moulds.

It also covers the function and design of downstream and ancillary equipment; principles of controlling and handling the parison and product, material feeders, various range of downstream equipment available, the range of secondary operations available, etc.

The unit introduces the learner into the concepts and requirements to start, control and optimise a specific type of parison blow moulding set-up, including typical systems and techniques for configuring the mould and ancillary equipment to the machine, potential safety hazards and how they are managed, process considerations and parameters for a range of parison blow moulding materials used, how productivity and quality of the parison and product can be affected by the interaction of the range of the process controls, etc.

It also investigates how to recognise and overcome parison blow moulding processing and product faults by considering different strategies of fault

finding, identifying process and product faults, their symptoms, possible causes relating them to the processing conditions and considering possible processing solutions.

### PD2 – Processing thermoplastics by Parison Blow Moulding

The key unit of the qualification where knowledge of safety, equipment, tooling, materials, engineering and quality come together in applying safe, logical and efficient procedures to set up the process.

This unit is delivered, wherever possible, using the company's own equipment to ensure learning relates to the real-life production environment. It covers safely mounting a mould, efficiently starting the moulding machine, initially stabilising the process by inputting suitable settings, identifying any process or product faults and their root causes and carrying out further adjustments to achieve the required quality and output.

The process is then optimised by using appropriate process capability studies, analysing the results and determining an effective plan for possible further improvements.

The learner will also recommend any modifications to the mould, downstream equipment or material specification to optimise and improve the process.

The unit will enable learners to carry out setting by applying a safe and logical approach to use routinely on a daily-basis. Where a product fault or process problem occurs during production having the ability to gather information, identify the root cause and its possible remedies then logically apply changes to settings can make a significant contribution to production performance.

# PROCESS PATHWAYS

## PREFORM BLOW MOULDING

### PE1 – Principles of Thermoplastic Materials Processing

Investigates the needs and behaviour of a range of thermoplastic materials used for the processing technique during each stage of the process and looks at how process conditions affect the process and product, focusing on equipment function, forming tool features, operational requirements and support services required for the process.

The unit covers the design features of the thermoplastic processing technique and forming tool designs available including; methods of controlling heating and cooling, etc. It also covers the function and design of support equipment; principles of controlling and handling the product, material feeders, the range of downstream equipment available, the range of secondary operations available, etc.

The unit introduces the learner into the concepts and requirements to start, control and optimise a specific type of thermoplastic processing technique, including typical systems and techniques for configuring the production set-up, potential safety hazards and how they are managed, process considerations and parameters for a range of processing materials used with the technique, how productivity and quality can be affected by the interaction of the range of processing controls, etc.

It also investigates how to recognise and overcome processing and product faults by considering different strategies of fault finding, identifying process and product faults, their symptoms and possible causes relating them to the processing

conditions and considering potential processing solutions.

### PE2 – Processing of Thermoplastics by a Production technique

The key unit of the qualification where knowledge of safety, equipment, tooling, materials, engineering and quality come together in applying safe, logical and efficient procedures to set up the process.

This unit is delivered, wherever possible, using the company's own equipment to ensure learning relates to the real-life production environment. It covers safely mounting a mould, efficiently starting the moulding machine, initially stabilising the process by inputting suitable settings, identifying any process or product faults and their root causes and carrying out further adjustments to achieve the required quality and output.

The process is then optimised by using appropriate process capability studies, analysing the results and determining an effective plan for possible further improvements.

The learner will also recommend any modifications to the mould, downstream equipment or material specification to optimise and improve the process.

The unit will enable learners to carry out setting by applying a safe and logical approach to use routinely on a daily-basis. Where a product fault or process problem occurs during production having the ability to gather information, identify the root cause and its possible remedies then logically apply changes to settings can make a significant contribution to production performance.

# MANDATORY UNITS

## PM1 – Polymer Processing Health Safety and the Environment

This knowledge-based unit introduces the learner to the importance of health, safety and environmental issues within a polymer processing sector.

It covers the importance of statutory environmental regulations and individual organisational requirements including energy efficiency, sustainability, and record keeping.

It also covers the importance of statutory health and safety regulations and individual organisational requirements including the principles that underpin good safety, the management and the control of safety systems, employers and employees responsibilities, sources of health and safety literature, etc.

The unit covers the importance of safe working practices and procedures including the importance of; safe systems of work, standard operating procedures and permits to work, hazards associated with the polymer processing sector, risk assessment with regard to potential health and safety hazards, the use of personal protective equipment, lifting operations and Lifting Equipment Regulations, the use of safe manual handling and common safety signage used in a polymer processing environment.

## PM2 – Polymer Processing Engineering Principles

This knowledge-based unit introduces the learner to engineering concepts utilised in polymer processing operations. It includes the principles of document control, interpretation of engineering information, including drawings, dimension and labelling, databases, spreadsheet, CAD systems and the application of engineering polymer processing calculations.

The unit focuses on the requirements of the mechanical equipment design, concepts and

operational support services used in polymer processing including mechanical joining and connection techniques, clamping, locking and holding methods, seals and gaskets, process cooling and heating systems together with power transmission systems.

It covers the principles and function of pneumatics, hydraulics, electronics and electrical systems together with the operation of components, interpretation of circuits and drawings, the use of pipe work, seals and connections found in the polymer processing sector; it also emphasises the potential hazards and precautions required.

Maintenance practices, faulty finding techniques and process trouble shooting approaches are covered, ensuring the learner can define faults, symptoms, breakdowns and potential causes, thereby use fault finding techniques and process trouble shooting approaches with polymer processing techniques.

## PM3 - Principles of Polymer Materials and their Processing Behaviour

This knowledge-based unit introduces the learner to the wide range of polymer processing materials, including thermosetting polymers, thermoplastics and composites.

It includes how polymers are polymerised, common terminology used and trade names, as well as families or groups of polymers.

The unit introduces polymer chemistry at a basic level, to illustrate how and why certain plastics behave in the ways they do.

It also includes how additives are used, how the different families of thermoplastic polymer materials flow and behave during processing, their properties and applications and includes reused polymers.

## PM4 - Polymer Processing Technologies, Methods and Processes

Introduces the learner to the processing behaviours of a range of thermosetting and thermoplastic materials when undergoing different manufacturing process techniques, it also looks at the thermoplastic material processing tests and how processing characteristics affect both the processing capability and product properties.

It evaluates different methods of shaping and processing polymer composites, thermosets and thermoplastics, it reviews batch and continuous polymer process techniques, the prime equipment, support equipment and forming equipment. It also evaluates the set up and running resources and costs required for different types of polymer process techniques.

The unit investigates the need and techniques for a range of polymer materials to be prepared prior to processing including pre-heating, adding colourants and additives for a range of processes.

It also looks at the range of post processing techniques, including thermoset and thermoplastic products e.g. cooling operations, post curing, printing/decorating techniques, product moving and handling techniques, finishing techniques; all used for both "batch" and "continuous" type production.

### PM5 - Principles of Quality and Process Management used in Polymer Processing

Introduces the learner to the concepts of quality management principles including quality assurance, inspection and quality control, fitness for purpose, standard operating procedures, the need for validating and calibrating test and measuring equipment, sampling, auditable records and the roles and responsibilities within a polymer processing quality regime.

It informs the learner of quality improvement and management systems, including the methods and

benefits of lean manufacturing. It also covers the range and benefits of the various national and international quality certification standard schemes used in the polymer processing industry and the benefit to processors, suppliers, customers and end users.

This unit covers the need to recognise and manage potential quality issues, the importance of managing documentation including quality and inspection records and how to collect and analyse information. It also reviews fault finding processes including; identifying product faults, process faults, symptoms, causes and solutions.

### PM6 Personnel Employment, Communications and People Skills

Introduces the learner to the significance of employment rights and responsibilities within a polymer processing sector. It covers legislation, codes of practice, company policies, company procedures and work instructions in the following areas: - health & safety, environmental, employment rights, contracts of employment, job descriptions, working time directive, equality act, equal pay, parental leave.

It also looks at company policies and procedures for sickness, holidays, grievances, bullying, safeguarding, discrimination, data protection, disciplinary, equal opportunities, etc.

This unit covers the importance and benefits of working effectively with colleagues and describes organisational structures and responsibilities, the importance of developing positive and constructive working relationships and how to deal with conflict.

Learners will plan an investigation into a processing issue e.g. quality non-compliance reports, damage reports, process improvements and adjustments, scrap analysis, etc. by investigating and collecting information, analysing and evaluating information against agreed standards, producing a report and disseminating to colleagues.

The learner will also develop and complete process operating procedures, setting sheets or similar documents.

# TESTIMONIAL

Caledonian Plastics have worked in partnership with S4P since 2012: our latest Apprentice is approaching the end of his tenure with them and I have sought his views as well as expressing my own.

In the time that we have worked together, I have been enormously impressed with every aspect of the service S4P offers. Andy, John and Leon are 100% professional in their delivery but also extremely approachable and always great company when they visit.

All paperwork and all training is delivered in a timely fashion and we, as employers, are kept abreast of all developments and are offered the opportunity to give our feedback and offer ideas. We value the experience that their years in the plastics industry brings to their service delivery.

Our soon-to-graduate Apprentice has worked extremely well with S4P and clearly relishes the opportunities that this qualification will provide him with. He looks forward to his meetings with the team and is always extremely positive in his feedback. We can clearly see the huge strides forward he has taken as a result of the well-structured/delivered Apprenticeship scheme.

I would wholeheartedly recommend S4P to any employer who is looking for a proactive and friendly service provider. We are delighted to be able to put our thanks into words and wish them the very best of luck in all their forthcoming endeavours.

**Claire Wood**  
**Caledonian Plastics Limited**

# SCIENCE MANUFACTURING TECHNICIAN

## Level

3 (Advanced Apprenticeship)

## Duration

Minimum of 18 months, typically 30 months duration.

## Occupational profile

Science manufacturing technicians work in a wide range of companies, including, but not exclusively, chemical, primary and secondary pharmaceutical, biotechnology, formulated products and nuclear manufacturing. A science manufacturing technician will operate the systems and equipment, involved in the production of products. They may work in varied conditions including wearing specialist safety equipment, shift work and on sites running 365-day operations. Many companies operate under highly regulated conditions and a premium is placed on appropriate attitudes and behaviours to ensure employees comply with organisational safety and regulatory requirements.

Science manufacturing technicians are expected to work both individually and as part of a manufacturing team. They are able to work with minimum supervision, taking responsibility for the quality and accuracy of the work they undertake. They are proactive in finding solutions to problems and identifying areas for improving their work environment.

## Occupational Skills & Knowledge

Science manufacturing technicians are able to:

1. Both independently and within a team start-up a manufacturing batch or continuous process in line with appropriate Standard Operating Procedures, understanding the principles of operation.
2. Both independently and within a team operate a manufacturing batch or continuous process in line with appropriate Standard Operating Procedures, understanding the principles of operation.
3. Both independently and within a team shut down/complete a run of the manufacturing batch or continuous process in line with appropriate Standard Operating Procedures, understanding the principles of operation.
4. Work safely in a science manufacturing environment, understanding personal responsibility for Health, Safety and the Environment and principles of risk management.
5. Understand and follow quality procedures to meet the requirements of quality standards relevant to the workplace.
6. Understand the internal and external regulatory environment pertinent to the sector and the employer and comply with regulations proficiently.
7. Control and monitor a process or plant and equipment, effectively, efficiently and securely, and resolve problems or correct abnormal conditions.
8. Complete documentation relevant to the manufacturing process including relevant calculations.
9. Understand the business environment in which the company operates including personal role within the organisation, ethical practice and codes of conduct.
10. Participate in continuous performance improvement.
11. Develop and apply theoretical knowledge of relevant science and technology and its application to the required sector & job role.



## Behaviours

12. Science manufacturing technicians are able to demonstrate the required attitudes, behaviours and interpersonal skills associated with the professional workplace including:

- communicate effectively using a full range of skills: speaking; listening; writing; body language; presentation
- work and interact effectively within a team
- work independently and take responsibility for initiating and completing tasks
- understand impact of work on others, especially where related to diversity and equality
- time management and ability to complete work to schedule
- ability to handle change and respond to change management processes.

## Qualifications

- Apprentices without level 2 English and mathematics will need to achieve this level prior to completion of their apprenticeship.
- IOSH Working safely. Delivered by The College of West Anglia, this course covers the essentials of health and safety in the workplace. It is aimed at all workers in all types of organisation. Upon successful completion of the course and assessment, students are awarded a Working Safely certificate from the Institution of Occupational Safety and Health (IOSH), the world's largest health and safety membership organisation.
- Diploma in Polymer Processing, which is recognised for professional registration by PIABC, prior to completing the apprenticeship's end-point assessment.

## Link to professional registration

In association with the awarding organisation, PIABC, apprentices achieving the standard will gain the newly developed Diploma in Polymer Processing Level 3 which has been specifically developed for industry by the industry. This can lead to professional membership through the Institute of Materials, Minerals and Mining (IOM3)

# END POINT ASSESSMENT

**End Point Assessment (EPA)** is the name given to a series of tests an apprentice must take to prove their ability to do the job they have been training for. These tests take place at the **end** of an apprenticeship following a period of training and development often referred to as the 'on-programme' period. EPA is carried out by an independent organisation.

There are four components to end point assessment, a review of the behaviours evaluation log and three assessment tests. The assessment tests will be used to determine if the apprentice should receive the apprenticeship award. The Synoptic Assessment Test (SAT) and Vocational Competence Discussion should ideally take place on the same day.

## Behaviours Evaluation Log

During their training an apprentice's behaviours will be evaluated on at least 3 occasions over the course of the apprenticeship. The evaluation will be across seven categories:

- Personal Responsibility
- Communication
- Team Work
- Independence and Responsibility
- Impact of work
- Time management
- Change management

There will be 3 possible outcomes:

**Does not meet Expectation:** Apprentice failed to demonstrate an acceptable level of behaviour. Improvement is required.

**Meets Expectation:** Apprentice demonstrated acceptable level of behaviour and meets the minimum level of behaviour expected.

**Exceeds Expectation:** Apprentice demonstrated consistent and positive behaviours in this area that reflect those expected of outstanding apprentices.

## Vocational Competence Discussion

The vocational competence discussion will cover the whole apprenticeship standard. It also provides the opportunity for presentation of evidence to support specific elements from the standard that it has not been possible to demonstrate during the SAT. As the discussion will be graded, Trailblazer employers have specified the following as areas where the apprentice may wish to provide evidence to contribute to grading:

- Control and monitor a process or plant and equipment, effectively, efficiently and securely, and resolve problems or correct abnormal conditions.
- Complete documentation relevant to the manufacturing process including relevant calculations.
- Participate in continuous performance improvement.

## Scenario Case Study

The case study will describe a scenario where the apprentice must adapt quickly and function effectively after minimal instruction on new equipment or in a new environment or under revised working practices. Whilst they will not be expected to know how to operate the particular equipment they will be expected to demonstrate the correct procedures to ensure they work safely, such as following safe systems of work, using appropriate personal protective equipment, finding and following standard operating procedures. The apprentice will be provided with a description of the scenario, which may be a narrative or a video and they will have to respond to situational analysis questions.

## Synoptic Assessment Test (SAT)

The purpose of the Synoptic Assessment Test is to validate the apprentice's competence by observing him/her carrying out his/her job role in a normal working environment under normal conditions. The employer must select one of these SATs to suit the assessment context:

### Science manufacturing technician SAT 1 – start up process. The apprentice must:

- Demonstrate either independently or within a team start-up of a manufacturing batch or continuous process in line with appropriate Standard Operating Procedures (SOP), ensuring work is carried out safely, and quality procedures are followed whilst complying with appropriate regulations.
- Control and monitor the process or plant and equipment, effectively, efficiently and securely, and resolve any problems or correct abnormal conditions that may arise.
- Demonstrate an understanding of the principles of operation through workplace discussion.

### Science manufacturing technician SAT 2 - operate process. The apprentice must:

- Demonstrate either independently or within a team operation of a manufacturing batch or continuous process in line with appropriate Standard Operating Procedures (SOP), ensuring work is carried out safely, and quality procedures are followed whilst complying with appropriate regulations.
- Control and monitor the process or plant and equipment, effectively, efficiently and securely, and resolve any problems or correct abnormal conditions that may arise.
- Demonstrate an understanding of the principles of operation through workplace discussion.

### Science manufacturing technician SAT 3 - shut down process. The apprentice must:

- Demonstrate either independently or within a team shut down/complete a run of a manufacturing batch or continuous process in line with appropriate Standard Operating Procedures (SOP), ensuring work is carried out safely, and quality procedures are followed whilst complying with appropriate regulations.
- Control and monitor the process or plant and equipment, effectively, efficiently and securely, and resolve any problems or correct abnormal conditions that may arise.
- Demonstrate an understanding of the principles of operation through workplace discussion.

For example, an apprentice working on a continuous process, where the opportunity for start-up and shut down occurs infrequently, would be tested using SAT 2 that covers operating the process.

# FURTHER INFORMATION

[www.solutions4polymers.co.uk](http://www.solutions4polymers.co.uk)

[www.cwa.ac.uk](http://www.cwa.ac.uk)

[www.piabc.org.uk](http://www.piabc.org.uk)

[www.iom3.org](http://www.iom3.org)

[www.instituteforapprenticeships.org](http://www.instituteforapprenticeships.org)

[www.apprenticeships.gov.uk](http://www.apprenticeships.gov.uk)





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