



# **PIABC LEVEL 7 END POINT ASSESSMENT FOR MATERIALS PROCESS ENGINEER (DEGREE)**

Qualification Number: 603/7542/5

Apprenticeship Standard Reference: ST0659  
Apprenticeship Assessment Plan Reference: ST0659/01

## **Specification**

Updated: 21 September 2022

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# 1. PURPOSE

This specification has been written to provide information about the Level 7 Materials Process Engineer (Degree) apprenticeship end point assessment for all individuals involved: apprentices, training providers, and employers. Information is correct at the time of publication. However, the specification may be updated from time to time to reflect any legislative, policy and/or operational changes.

## 2. INTRODUCTION

PIABC Limited is the trading subsidiary of The Institute of Materials, Minerals and Mining (IOM3). IOM3 is a major UK engineering institution whose activities encompasses the whole materials cycle, from exploration and extraction, through characterisation, processing, forming, finishing and application, to product recycling and land reuse. It exists to promote and develop all aspects of materials science and engineering, geology, mining and associated technologies, mineral and petroleum engineering, and extraction metallurgy, as a leading authority in the worldwide materials and mining community.

PIABC Limited is an End Point Assessment Organisation (EPAO) approved by the Education & Skills Funding Agency (ESFA) and listed on *Register of End-Point Assessment Organisations* (RoEPAO) to administer a range of End Point Assessment (EPA) to apprentices as specified in the relevant assessment plans.

Apprenticeships are work-based training programmes which combines a mix of blended learning and block delivery at training provider. Apprentices will take their learning from the classroom into their employer and apply their learning through workplace practice.

The development of the Level 7 Materials Process Engineer (Degree) apprenticeship was undertaken by a Trailblazer Group who are a group of representatives from Industry. This group identified the specialist KSBs that they felt were needed to perform at this level in their sector and these were put together into a standard, which defines the syllabus for the apprenticeship programme.

In addition, all employer-led apprenticeship standards must demonstrate acquisition of transferable skills – such as self-management, communication and interpersonal skills, problem solving, innovation and creativity.

## 3. A MATERIALS PROCESS ENGINEER

A Materials Process Engineer is found in a wide variety of thermal process related fields including casting, forging, machining, coating, heat treatment and surface finishing processes. These specialist areas are also found in a wide range of industries where materials and their processes are fundamental to the technology. Industries as diverse as medical, defence, energy, oil and gas, aerospace and nuclear all incorporate the skills of materials process engineers.

The broad purpose of a Materials Process Engineer is to perform a role which is unique to the materials/manufacturing community, controlling and managing the complex manufacturing processes and support services that are applied to products for the automotive, aerospace, medical, energy and construction sectors. They do this by collecting and organising all the information needed to understand the whole problem, exploring it from all angles, and then finding the most appropriate solution for integration into a sustainable product life cycle. A Materials Process Engineer might typically work in either the problem definition or solution provider environments, making critical decisions in the process and utilities to produce high-quality, cost-effective parts and systems, then testing and accepting the designed solutions. They provide

essential support to their associated businesses providing guidance and leadership in improving company metrics of quality, delivery, new product introduction and support key financial and business decisions.

In their daily work, a Materials Process Engineer interacts with all departments within the companies they work for and at a range of levels within the departments depending on the project in which they are engaged. Their focus will be with the engineering team, and they will also have strong links in support of the operations team. However, to fulfil many of the projects, links to finance, supply chain and customer support will be a day-to-day occurrence and as the activities broaden there will be strong communication to the wider external customer base both in a sales support activity and during technical project discussions.

A Materials Process Engineer will be responsible for implementing new products and processes and for many cost reduction and process improvement initiatives. They have direct responsibility for defining the methods of manufacture of complex engineering systems and the asset base and services which are used to produce high value manufactured products. In many cases weekly and monthly reports will be required at both team level and to senior members of the company.

## 4. END POINT ASSESSMENT & GATEWAY

The Level 7 Materials Process Engineer (Degree) apprenticeship standard describes the core and the specialist option (i.e. casting, coating, welding, brazing, heat treatment and surface treatment) KSBs that an apprentice should develop during the apprenticeship programme and the assessment plan identified how these KSBs will be assessed in the EPA.

The Level 7 Materials Process Engineer (Degree) assessment plan details how the apprentices will be assessed at the end of the programme. This final assessment is known as End Point Assessment (EPA). During the EPA, the apprentice will demonstrate their capability to perform their role to a consistent national standard and the methods used to test this vary from standard to standard.

An independent registered End Point Assessment Organisation (EPAO) will perform this perform the EPA and not the employer or training provider. PIABC Limited (EPA0685) is the only registered EPAO for the Level 7 Materials Process Engineer (ST0659), but many other Standards have more than one EPAO.

The EPA period will only start, and the EPA be arranged, once the employer is satisfied that the apprentice is consistency working at or above the level set out in the occupational standard, all the pre-requisite gateway requirements for EPA have been met and that they can be evidenced to PIABC Limited. The employer may take advice from the apprentice's training provider(s) in making this decision on whether the apprentice is consistency working at or above the level set out in the occupational standard, but the decision must be made solely by the employer.

All the pre-requisite gateway requirements for EPA must be evidenced to PIABC Limited.

The gateway requirement for the Level 7 Materials Process Engineer (Degree) standard are that the:

- apprentice must have completed the MSc Manufacturing Technology and Management prior to taking EPA.
- employer is satisfied that the apprentice is consistency working at or above the level set out in the occupational standard's KSBs.

Also, for all Level 3 apprenticeships and above apprentices without English and mathematics at Level 2 an apprentice must achieve Level 2 prior to taking their EPA.

An additional gateway requirement is that the apprentices need to submit a detailed work-based project outline, which includes the project's subject, title, and scope. The project outline will be agreed between the employer and PIABC Limited at the gateway. It is up to the employer to ensure it has a real business application and PIABC Limited to ensure it meets the requirements of the EPA (including suitable coverage of the KSBs assigned to this assessment method). PIABC Limited and employer will sign-off the project title to confirm its suitability at the gateway and prior to the project commencing.

The EPA must be completed within an EPA period lasting a maximum of 9 month(s), beginning when the apprentice has passed the EPA gateway.

## 5. SUMMARY OF ASSESSMENT

Apprentices on the Level 7 Materials Process Engineer (Degree) Standard are assessed throughout apprenticeship programme to ensure that the apprentices become competent materials process engineer. Apprentices will take their learning from the classroom into their employer and apply their learning through workplace practice.

The EPA consists of three discrete assessments, which can be summarised as:

### **ASSESSMENT METHOD 1 (AM1) - PROJECT REPORT AND PRESENTATION (8000 words, 20 minutes presentation and 40 minutes questioning)**

This will assess the apprentice's ability to generate a viable process improvement proposal, which focuses on technical elements that can yield efficiency/business improvements on an existing manufacturing method.

### **ASSESSMENT METHOD 2 (AM2) - PROFESSIONAL REVIEW (60 minutes)**

This assessment will take the form of a professional discussion to draw out KSB's, in particular behaviours, which would be less likely to occur in the project and presentation approaches of assessment one, but mirror those used in the day-to-day work environment.

### **ASSESSMENT METHOD 3 (AM3) - KNOWLEDGE AND SKILLS TEST (60 minutes)**

Compliments the other assessment methods and focuses on aspects of the standard not assessed elsewhere.

For more detailed information on each assessment methods, please see the relevant guidance document produced by PIABC Limited.

## 6. KNOWLEDGE, SKILLS AND BEHAVIOURS (KSBs)

The Level 7 Materials Process Engineer (Degree) apprenticeship standard states that all apprentices will need to develop specialist KSBs. These KSBs will be generic and/or technology specific, but the subject areas indicated below will provide a foundation for an apprentice development in materials process engineering.

The EPA provides apprentice with a showcase opportunity to provide oral and documentary evidence of their KSBs developed throughout the apprenticeship in a synoptic way. It enables the EPA panel to test the KSBs acquired by the apprentice throughout the apprenticeship.

The KSBs of the of the Level 7 Materials Process Engineer (Degree) apprenticeship standard are set out below:

## **AM1: WORK BASED PROJECT AND PRESENTATION**

### **Knowledge**

A Material Process Engineer will require a thorough understanding of the industry in which they are employed. They will be able to understand and apply the following areas:

- K1** Theories of team working
- K2** Principles of programme management
- K4** Risk management theories and practice
- K23** The principles of effective presentations (including planning, structuring, how and when to engage with the audience, using visual aids, presenting data)
- K24** Art of technical report writing
- K25** Principles of mentoring people
- K26** Fundamentals of casting process and technology\*
- K28** Fundamentals of coating processes and technology\*
- K29** Fundamentals of welding processes and technology\*
- K30** Fundamentals of brazing processes and technology\*
- K31** Fundamentals of heat treatment processes and technology\*
- K32** Fundamentals of surface treatment processes and technology\*

### **Skills**

A Material Process Engineer will be asked to demonstrate skills in the following:

- S1** Work within a team environment. This may include acting as a team leader with people management skills. They undertake risk analysis and problem solving on behalf of the team
- S2** Communicate and present information appropriately and effectively taking account of target audience
- S3** Apply appropriate programme management tools. Typically, this would include a RACI chart, Project Plans, Load and Capacity analysis and cost analysis
- S5** Mentor and support others using coaching skills and actively support continuous professional development
- S7** Operate and control process equipment using continuous improvement methodologies
- S8** Apply process control procedures correctly and effectively
- S11** Make appropriate use of problem-solving tools (e.g. 8D, 5 whys)
- S12** Apply change control tools and practices
- S13** Apply risk management tools and techniques
- S15** Apply production control methods (e.g. planning and project management)
- S16** Correct use of specialist equipment and process knowledge\*

### **Behaviours**

A Material Process Engineer will be asked to demonstrate the following behaviours:

- B1** Working collaboratively - is comfortable in working in teams and being a team leader to agreed goals\*
- B3** Commitment to leadership - Taking personal responsibility for their actions, managing projects including resource management within their remit and able to mentor and instruct others in associated standards and best practice\*
- B5** Curiosity and Innovation Utilising own and others creativity to Improve the industry through embracing new technology and the digital world\*
- B6** System Thinking Seeing whole systems and parts and how they connect recognising interdependencies and integration\*

## AM2: PROFESSIONAL REVIEW

### Knowledge

A Material Process Engineer will require a thorough understanding of the industry in which they are employed. They will be able to understand and apply the following areas:

- K3** Understanding the importance of conflict management
- K5** Principles of Quality Management Systems and implementation in factory environments
- K6** New product introduction and technology management - theory
- K17** Principles of Lean Manufacturing
- K18** Cost based engineering (including estimating, cost control, cost forecasting, investment appraisal and risk analysis)
- K19** Principles of Operations Management
- K20** Principles of Leadership in Operations Management
- K21** Principles of Supply Chain Management
- K22** Principles of Asset Management
- K27** Fundamentals of the product life cycle

### Skills

A Material Process Engineer will be asked to demonstrate skills in the following:

- S4** Actively listen and explain clearly and appropriately to target audience
- S9** Apply appropriate negotiation techniques effectively
- S17** Correct use of product life cycle concepts\*

### Behaviours

A Material Process Engineer will be asked to demonstrate the following behaviours:

- B2** Professional Commitment - Commitment to corporate values and behaviours through the demonstrating a personal, ethical, and professional commitment to society, their profession, and the environment, adopting a set of values and behaviours that will maintain and enhance the reputation of the profession as well as their organisation\*
- B4** Commitment to the profession contributing proactively to the continuing development of engineering within their domain\*

## AM3: KNOWLEDGE AND SKILLS TEST

### Knowledge

A Material Process Engineer will require a thorough understanding of the industry in which they are employed. They will be able to understand and apply the following areas:

- K7** Importance of design for manufacture and assembly
- K8** Principles and practices of engineering standards
- K9** Principles of process risk management including Process Failure Modes and Effects Analysis (PFMEA)
- K10** Principles of Stakeholder management
- K11** Importance of working within a regulatory framework
- K12** Importance of Intellectual Property, Patents & Export Control
- K13** The function of Quality Techniques Systems and Standards
- K14** The principles of statistical process control and application techniques (e.g. PFMEA)
- K15** Change management principles
- K16** Principles and practices of knowledge-based systems

## Skills

A Material Process Engineer will be asked to demonstrate skills in the following:

- S6** Use Process Failure Mode Effect Analysis tool kit appropriately
- S10** Make appropriate use of statistical tools e.g. Minitab, excel, DMAIC
- S14** Demonstrate correct application of Value Stream Mapping tools

\* These KSBs are mapped to apprentice's specialist option (i.e. casting, coating, welding, brazing, heat treatment and surface treatment).

For an apprentice to pass the EPA as a whole and be deemed to be competent, the apprentice must pass all assessment methods (AM1, AM2 and AM3).

## 7. ORDER OF ASSESSMENT METHODS

AM3 should be completed first. AM1 and AM2 can be administered in any order and are likely to be carried out simultaneously with AM1 commencing as soon as the project outline has been agreed.

The reason for this order is that AM3 is the most cost-effective method to confirm competency of the knowledge and skills assigned to this method of assessment. For this reason, it needs to be passed first as this mitigates the risk of launching a project if the apprentice does not possess the complementary underpinning knowledge that supports the other assessment methods.

## 8. WEIGHTING OF ASSESSMENT METHODS

All assessment methods (AM1, AM2 and AM3) are equally weighted.

## 9. GRADING CRITERIA

Apprentices will only be assessed on KSBs mapped to the core and the ones mapped to their specialist choice (i.e. casting, coating, welding, brazing, heat treatment and surface treatment).

The assessment criteria and full grading descriptors for each assessment method are on the following pages.

## AM1: WORK-BASED PROJECT & PRESENTATION

PIABC Limited will assess the apprentice against the higher order descriptors outlined in the Pass and Distinction columns rather than the lower order KSBs references in the second column. By showing competence against the higher order descriptors, then it will be assumed that the apprentice is working at or above the level outlined in the standard. The apprentice will be considered to have failed if they do not meet the criteria outlined in the pass descriptor. Fail - The apprentice will be deemed to have failed if they do not meet the criteria outlined in the pass descriptor.

The assessment criteria and full grading descriptors are:

Area of Assessment	Method	Pass Criteria – The apprentice’s project must demonstrate that they:	A successful contribution at distinction will meet the pass criteria in all areas and meet seven of the individual distinction descriptors from the criteria below:
Application of technical knowledge	<p><b>K26</b> Fundamentals of casting process and technology*</p> <p><b>K28</b> Fundamentals of coating processes and technology*</p> <p><b>K29</b> Fundamentals of welding processes and technology*</p> <p><b>K30</b> Fundamentals of brazing processes and technology*</p> <p><b>K31</b> Fundamentals of heat treatment processes and technology*</p> <p><b>K32</b> Fundamentals of surface treatment processes and technology*</p>	Applies appropriate theoretical and technological methods to design, develop and commission engineering solutions, with reference to the appropriate process relating to their specialism.	Appraises solution and explains the risks and implications of the process, alternative approaches and ways to address them.

Area of Assessment	Method	Pass Criteria – The apprentice’s project must demonstrate that they:	A successful contribution at distinction will meet the pass criteria in all areas and meet seven of the individual distinction descriptors from the criteria below:
<p>Manage the delivery of innovative, stable and robust solutions with full integration into the Manufacturing ecosystem</p>	<p><b>S12</b> Apply change control procedures</p> <p><b>S15</b> Apply production control methods</p> <p><b>S16</b> Use of specialist equipment and process knowledge*</p> <p><b>B3</b> Commitment to leadership - Taking personal responsibility for their actions, managing projects including resource management within their remit and able to mentor and instruct others in associated standards and best practice*</p> <p><b>B5</b> Curiosity and Innovation - Utilising own and others creativity to Improve the industry through embracing new technology and the digital world*</p> <p><b>B6</b> System Thinking - Seeing whole systems and parts and how they connect recognising interdependencies and integration*</p>	<p>Demonstrates resilience and determination in achieving project outcomes and that they are able to interact with team members and stakeholders to achieve successful outcomes.</p> <p>Proposes solutions based on in-house knowledge and expertise relating to specialist equipment and processes used in the company.</p> <p>Takes a broad view into account, looking at the whole system, not just component parts when making key decisions, embracing specialist equipment and new technology and communicating with stakeholders.</p> <p>Selects and interprets change control procedures and production methods, as appropriate, and applies the requirements leading to the successful delivery of the project.</p> <p>Evidence of consistent professional working practices, taking responsibility for their own actions with clear examples of leadership and followership. Approach demonstrates curiosity and innovation.</p>	<p>Challenges the norm and investigates, proposes and articulates solutions outside the immediate business and industry sector, including researching new methods and technologies which could be applied to problems encountered in the material process engineer environment, demonstrated by supporting evidence.</p> <p>Demonstrates an understanding of the risks and implications to the business of the application of new technologies and in the way procedures and methods are selected, and unintended consequences to the business when they are applied (i.e they understand that solving problem A, can cause problem B and can weigh up the benefits).</p>

Area of Assessment	Method	Pass Criteria – The apprentice’s project must demonstrate that they:	A successful contribution at distinction will meet the pass criteria in all areas and meet seven of the individual distinction descriptors from the criteria below:
Deliver Materials Process systems engineering/ operational solutions effectively	<b>K4</b> Risk management theories and practice  <b>S13</b> Use of risk management tools	Leads the application of risk management tools and techniques meaning the engineering/operational solution is well managed and successfully implemented.	Interprets, critically evaluates and recommends actions to mitigate problems which have the potential to impact business performance for example, impact on product quality, cost and delivery.
Lead/manage multi-disciplinary teams	<b>K25</b> Principles of mentoring people  <b>S5</b> Mentoring	Leads their team with appropriate mentoring/coaching for individuals within the team, understanding the importance of team values to support a high-performance work culture.	Demonstrate the ability to lead beyond the immediate team at organisational level and above to motivate and mentor people beyond those they directly line-manage to produce a high-performance work culture, showing insight into the needs and motivations of others.
Use of team and role play theory to develop high performance teams and individuals	<b>K1</b> Theories of team working  <b>S1</b> Working within a team environment  <b>B1</b> Working collaboratively - is comfortable in working in teams and being a team leader to agreed goals*	Demonstrates understanding of team and role theory and evidence of application of theory to produce intended outcomes.	Applies theory with insight and awareness of risks and rewards, describing how theory was applied with clear analysis of the impact and risks.

Area of Assessment	Method	Pass Criteria – The apprentice’s project must demonstrate that they:	A successful contribution at distinction will meet the pass criteria in all areas and meet seven of the individual distinction descriptors from the criteria below:
Manage the delivery of engineering solutions within a regulated sector	<b>K2</b> Principles of programme management  <b>S3</b> Use of programme management tools	Manages delivery with appropriate levels of planning, governance, implementation and relevant risk management procedures pertaining to the discipline, and use of appropriate programme management tools.	Investigates innovative improvement methods and techniques and evaluates their suitability for use within the context of their discipline. Takes a leadership role in justifying the use of such tools and techniques and supporting the organisation in achieving benefits from using them.
Use of communication and influencing skills	<b>K23</b> Presentation Skills  <b>K24</b> Art of technical report writing	<p>Presents and communicates the key content and messages bounded by quality information pertaining to the discipline. Written report includes introduction, methodology, results and conclusion and defends choice of methods selected. Report takes account of the target audience, is grammatically correct and cohesive.</p> <p>Motivates and mentors team members in both their technical and professional development.</p>	<p>Drafts report in a way that ensures arguments flow from each other to a logical conclusion, which are outlined in a non-confrontational way, encouraging discussion.</p> <p>Responds to technical questioning during presentation with ability to argue and defend their view while showing respect for the opinions of others.</p> <p>Applies best practices with a disciplined and responsible approach to avoid risk through application of technical skills and mitigation strategies.</p>

Area of Assessment	Method	Pass Criteria – The apprentice’s project must demonstrate that they:	A successful contribution at distinction will meet the pass criteria in all areas and meet seven of the individual distinction descriptors from the criteria below:
Use six-sigma methodologies, problem	<b>S11</b> Make appropriate use of problem-solving tools	Applies improvement management tools and techniques meaning that the project is well managed and successfully implemented.	<p>Demonstrates an understanding of problem-solving tools and the application of them and how they might enhance the business, selecting the most appropriate but discussing merits of alternatives.</p> <p>Understands the risks and benefits of each when making the selection.</p>
Use data analytics, process control methodologies and design principles	<p><b>S7</b> Operate and control process equipment</p> <p><b>S8</b> Apply process control procedures correctly and effectively</p>	Demonstrates evidence that the correct selection of the approach is aligned with the problem being addressed within the work-based project. Well-structured approach to data analysis and how this is integrated into the process standards/controls pertaining to the discipline.	Compares a range of principles and techniques to enhance the robustness of decisions, is able to critique the various options and provide supporting evidence for justifying and defending preferred option.

\* These KSBs are mapped to apprentice’s specialist option (i.e. casting, coating, welding, brazing, heat treatment and surface treatment).

## AM2: PROFESSIONAL REVIEW GRADING CRITERIA

PIABC Limited will assess the apprentice against the higher order descriptors outlined in the Pass and Distinction columns rather than the lower order KSBs references in the second column. By showing competence against the higher order descriptors, then it will be assumed that the apprentice is working at or above the level outlined in the standard. The apprentice will be considered to have failed if they do not meet the criteria outlined in the pass descriptor. Fail - The apprentice will be deemed to have failed if they do not meet the criteria outlined in the pass descriptor.

The assessment criteria and full grading descriptors are:

Area of Assessment	Method	Pass Criteria – The apprentice’s project must demonstrate that they:	A successful contribution at distinction will meet the pass criteria in all areas and meet seven of the individual distinction descriptors from the criteria below:
Manage the delivery of cost optimised innovative, stable, and robust solutions with integration into the product life cycle	<b>K6</b> New product introduction and technology management – theory  <b>K18</b> Cost based engineering  <b>K27</b> Fundamentals of the product life cycle  <b>S4</b> Actively listen and explain clearly and appropriately to target audience  <b>S17</b> Correct use of product life cycle concepts*	Demonstrates an understanding of the product life cycle concepts in a materials process environment, with reference to new products, and the business and cost benefits which result from adoption of such an approach.  Listens carefully to questions and communicates clearly, using appropriate language for target audience. Overall approach demonstrates consideration of how best to present and communicate the key content and messages.	Demonstration of a leadership role in justifying the use of product life cycle concepts and clear evidence that the organisation in achieving business benefits from implementation.

Area of Assessment	Method	Pass Criteria – The apprentice’s project must demonstrate that they:	A successful contribution at distinction will meet the pass criteria in all areas and meet seven of the individual distinction descriptors from the criteria below:
Demonstrate the use of lean manufacturing and operational techniques for continuous improvement	<p><b>K17</b> Principles of Lean Manufacturing</p> <p><b>K19</b> Principles of Operations management</p> <p><b>K21</b> Principles of Supply Chain Management</p> <p><b>K22</b> Principles of Asset Management</p>	Discusses manufacturing operations techniques their understanding of these and how they are able to be selected, applied and critiqued.	Manufacturing operation techniques are compared, contrasted, and illustrated with examples given of applying to their discipline, whilst demonstrating critical appraisal, insight and reflection.
Demonstrate CPD	<p><b>B2.</b> Professional Commitment - Commitment to corporate values and behaviours through the demonstrating a personal, ethical, and professional commitment to society, their profession, and the environment, adopting a set of values and behaviours that will maintain and enhance the reputation of the profession as well as their organisation*</p> <p><b>B4</b> Commitment to the profession - Contributing proactively to the continuing development of engineering within their domain*</p>	Describes the importance of professionalism to the organisation, with examples of demonstrating an ethical approach and a commitment to the environment.	Demonstrates a positive mind-set and willingness to learn, displaying proactive approach to enhancing the profession with examples of the development of engineering beyond their immediate domain.

Area of Assessment	Method	Pass Criteria – The apprentice’s project must demonstrate that they:	A successful contribution at distinction will meet the pass criteria in all areas and meet seven of the individual distinction descriptors from the criteria below:
Demonstrate collaborative working techniques	<b>K3</b> Understanding the importance of conflict management  <b>S9</b> Apply appropriate negotiation techniques effectively	Demonstrates an understanding of the importance of collaborative working techniques, and how they can be applied to manage conflict. Gives an example of this	Justifies their choice of techniques, explaining the risks and benefits and offers an alternative.
Manage the delivery of engineering/operational improvements in a regulated sector	<b>K5</b> Principles of quality management systems and implementation in factory environments  <b>K20</b> Principles of leadership in operations management	Demonstrates leadership and insight in the way projects are selected and implemented with compliance to the appropriate quality management systems to enhance business performance in terms of cost, quality and delivery.	Explains why quality management is important within the discipline and demonstrates leadership theory and practice to deliver improvement solutions to the required standard, making informed critical judgements and defending their decision(s) to improve the business.

\* These KSBs are mapped to apprentice’s specialist option (i.e. casting, coating, welding, brazing, heat treatment and surface treatment).

### AM3: KNOWLEDGE AND SKILLS TEST GRADING CRITERIA

EPAOs should focus on assessing the apprentice against the higher order descriptors outlined in the Pass column rather than the lower order KSBs references in the second column. By showing competence against the higher order descriptors, it can be assumed that the apprentice is working at or above the level outlined in the standard. Fail - The apprentice will be deemed to have failed if they do not meet the criteria outlined in the pass descriptor.

The assessment criteria and full grading descriptors are:

Area of Assessment	Method	Pass Criteria - The apprentice must demonstrate that they:
Deliver material process engineering/operational solutions effectively	<p><b>K7</b> Importance of design for manufacture and assembly</p> <p><b>K10</b> Principles of Stakeholder management</p> <p><b>K11</b> Importance of working within a regulatory framework</p>	Describe the key design processes which underpin engineering/operational performance ensuring effective identification, delivery, implementation and management of all stakeholders and adherence to regulation.
Use of six-sigma methodologies, data analysis, problem solving and continuous improvement	<p><b>K9</b> Principles of process risk management including Process Failure Modes and Effects Analysis (PFMEA)</p> <p><b>K14</b> The principles of statistical process control and application techniques (e.g. PFMEA)</p> <p><b>K15</b> Change management principles</p> <p><b>S8</b> Use of process failure mode effect analysis tool kit</p> <p><b>S10</b> Use of statistical tools</p>	Selects and applies appropriate PFMEA, statistical tools and techniques to make recommendations suitable for identification of operational improvements in a materials process engineer environment.

Area of Assessment	Method	Pass Criteria - The apprentice must demonstrate that they:
Management of Intellectual Property	<b>K12</b> Importance of Intellectual Property, Patents and Export Control	Demonstrates an understanding of the major ideas related to the control of intellectual property and the importance of compliance
Safe and professional working practices	<b>K8</b> Principles and practices of engineering standards  <b>K13</b> The function of Quality Techniques Systems and standards	Demonstrate the key processes which underpin safe and professional working practices and describes the function of Quality Techniques Systems and standards.
Manage the delivery of a stable manufacturing/operational solutions optimised for whole life costing	<b>K16</b> Principles and practices of knowledge-based systems  <b>S14</b> Demonstrate correct application of Value Stream Mapping tools	Able to demonstrate how to manage and evaluate value engineering, whole life costing as applying to their discipline

## 10. OVERALL GRADING

All EPA methods must be passed for the EPA to be passed overall.

A distinction must be achieved in AM1 and AM2 of the assessment methods to achieve an overall grade of a distinction.

Grades from individual assessment methods should be combined in the following way to determine the grade of the EPA as a whole:

AM1	AM2	AM3	Overall Grade
Any	Any	Fail	Fail
Any	Fail	Any	Fail
Fail	Any	Any	Fail
Pass	Pass or Distinction	Pass	Pass
Pass or Distinction	Pass	Pass	Pass
Distinction	Distinction	Pass	Distinction

This apprenticeship is designed to prepare successful apprentices to meet the requirements for registration as Chartered Engineer with a Professional Engineering Institute (PEI), such as Institute of Materials, Minerals and Mining (IOM3), or as a Chartered Designer.

## 11. ASSESSMENT CONTROLS

An overview of the assessment controls which apply to the EPA detailed in the table below:

Control Description	Conditions
Submission of work-based project outline (AM1)	Apprentices need to submit a detailed work-based project outline, which includes the project's subject, title and scope at gateway. PIABC Limited and employer will sign-off this off to confirm its suitability at the gateway and prior to the 30-week period for the work-based project commencing.
Order of Assessment Methods	AM3 needs to be completed first. AM1 and AM2 can be administered in any order and are likely to be carried out simultaneously with AM1 commencing as soon as the project outline has been agreed.
Submission of work-based project report (AM1)	The apprentice must submit their work-based project report to PIABC Limited in PDF format after a maximum of 30 weeks of the EPA start date.
Submission of presentation (AM1)	The apprentice must submit their presentation and outline details of any visual aids to be used and specify any equipment required 10 days after submission of the Work-Based Project Report.
Punctuality and timing	All apprentices must be on time for the start of their knowledge and skills test, presentation, and professional review elements of their EPA. It is recommended that apprentices arrive at least 30 minutes before its scheduled start. In instances where the apprentice may arrive late, the apprentice must inform their employer or training provider as soon as possible so the Independent

	Assessor/Invigilator is aware. The Independent Assessor will aim to accommodate the apprentice for the presentation and professional review elements of their EPA, but not at the cost of disrupting other scheduled apprentices. If the apprentice is late for the start of the knowledge and skills test, then the invigilator will not allow the apprentice to enter the test room as this will cause disruption to other apprentices.
Venue environment	The presentation and professional review must take place in suitable room that should be well lit, noise free and without visible distractions. If on arrival the Independent Assessor deems the room environment unsuitable, then the presentation or professional review maybe delayed or cancelled. Ensure appropriate environment meets health & safety requirements.
Mobile phones and tablets	The use of mobile phones and other electronic devices at any of the assessment methods by the apprentice is prohibited. All panel devices must also be switched off, exception to this rule is when a device is being used by the apprentice during their assessment.
Identification confirmation	Apprentices must bring personal photographic identification (e.g. passport or driving licence), which will be checked before the assessment proceeds.
Collaboration	<p>Whilst apprentices can work with their training providers in groups as part of the on-programme stage of the apprenticeship; the EPA itself is an assessment of individual apprentice and does not allow collaboration between apprentices.</p> <p>The employer representative at the presentation element of the assessment is not to provide any advice. If the Independent Assessor feels collaboration rules are breached, then the apprentice's EPA will be ended.</p>
Dress code	Apprentices are expected to look smart on the days of their presentation and professional review. This must be in accordance with health and safety requirements of the venue (e.g. no open toe shoes).
Equipment & technology	Any equipment and technology that required is available and in full working order, to demonstrate the apprentice's KSBs.

## 12. ASSESSMENT/MARKING FORMS

### AM1: WORK-BASED PROJECT & PRESENTATION ASSESSMENT FORM

Apprentice's Full Name				
Apprentice's ULN				
Date of Professional Review				
Location of Professional Review				
Please use this assessment form to establish that the apprentice has demonstrated and evidenced each area of assessment within AM1: Work-Based Project and Presentation using the knowledge, skills, and behaviour (KSBs). For more information on which KSBs are mapped to the areas of assessment, please refer to "AM1: Work-Based Project & Presentation Grading Criteria".				
Area of Assessment	Fail	Pass	Dist.	Comments
Application of technical knowledge				
Manage the delivery of innovative, stable and robust solutions with full integration into the manufacturing ecosystem				
Deliver Materials Process systems engineering/ operational solutions effectively				
Lead/manage multi-disciplinary teams				
Use of team and role play theory to develop high performance teams and individuals				
Manage the delivery of engineering solutions within a regulated sector				
Use of communication and influencing skills				
Use six-sigma methodologies, problem				
Use data analytics, process control methodologies and design principles				
<b>Overall Comments</b>				
<b>EPAO Independent Assessor</b>				
Full Name:				
Signature:				
Date:				

## AM2: PROFESSIONAL REVIEW ASSESSMENT FORM

Apprentice's Full Name				
Apprentice's ULN				
Date of Professional Review				
Location of Professional Review				
Please use this assessment form to establish that the apprentice has demonstrated and evidenced each area of assessment within AM2: Professional Review using the knowledge, skills, and behaviour (KSBs). For more information on which KSBs are mapped to the areas of assessment, please refer to " <i>AM2: Professional Review Grading Criteria</i> ".				
Area of Assessment	Fail	Pass	Dist.	Comments
Manage the delivery of cost optimised innovative, stable, and robust solutions with integration into the product life cycle				
Demonstrate the use of lean manufacturing and operational techniques for continuous improvement				
Demonstrate CPD				
Demonstrate collaborative working techniques				
Manage the delivery of engineering/operational improvements in a regulated sector				
<b>Overall Comments</b>				
<b>EPAO Independent Assessor</b>				
Full Name:				
Signature:				
Date:				

### AM3: KNOWLEDGE AND SKILLS TEST MARKING FORM

Apprentice's Full Name	
Apprentice's ULN	
Date of Knowledge and Skills Test	

Please use this marking form for marking the AM3: Knowledge and Skills Test. For more information on which KSBs are mapped to the areas of assessment, please refer to "AM3: Knowledge and Skills Test Grading Criteria".

Question No.	Question	KSB	Marks Available	Marks
1			1	
2			1	
3			1	
4			1	
5			1	
6			1	
7			1	
8			1	
9			1	
10			1	
11			1	
12			1	
13			1	
14			1	
15			1	
16			5	
17			5	
18			5	
19			5	
20			5	
21			5	
22			5	
23			5	
24			5	
25			5	
<b>Total</b>			<b>65</b>	

**EPAO Representative (Questions 1 – 15)**

Full Name:	
Signature:	
Date:	

**EPAO Independent Assessor (Questions 16 – 25)**

Full Name:	
Signature:	
Date:	

<b>GRADE AWARDED</b>	
<b>FAIL (≤45)</b>	
<b>PASS (≥45.5)</b>	

## 13. RE-SITS/RE-TAKES

Apprentices who fail one or more assessment method will be offered the opportunity to take a re-sit or a re-take. A re-sit does not require further learning, whereas a re-take does.

The apprentice should have a supportive action plan to prepare for the re-sit or a re-take. The apprentice's employer will need to agree that either a re-sit or re-take is an appropriate course of action.

The apprentice, who fails an assessment method, and therefore the EPA in the first instance, will be required to re-sit or re-take any failed assessment methods only.

Re-sits and re-takes are not offered to apprentices wishing to move from pass to distinction.

Where any assessment method has to be re-sat or re-taken, the apprentice will be awarded a maximum EPA grade of pass, unless the EPAO determines there are exceptional circumstances requiring a re-sit or re-take.

## 14. ENQUIRIES & APPEALS FOR ASSESSMENT DECISIONS

There may be occasions where PIABC Limited make assessment decisions that the apprentice, employer or training provider do not agree with. Enquiries about assessment decisions can be submitted in relation to the following decisions made by the EPA team. This can be submitted once all EPAs have taken place and been given a final grade:

- decisions regarding special considerations
- quality assurance decisions

An enquiry about an assessment decision has two options:

- clerical check – a check that necessary information has been considered in the assessment decision
- re-assessment – a full review of the evidence and decision

### Appeals

PIABC Limited's appeals process allows apprentice, employer or training provider to outline their views/grievances in relation to the results of an assessment, following the outcome of the enquiry about assessment decisions process, where apprentice, employer or training provider believe we did not apply our procedures consistently, properly or fairly.

The findings from the appeals process will enable an objective, factually based judgment to be reached.

For more information, please see "*End Point Assessment Service - The Appeals Process (for Appeals against PIABC Limited decisions)*", which is available on request from the EPA team.

## 15. PRIOR LEARNING

Recognised prior learning is not available for this end point assessment.

## 16. SUCCESSFUL COMPLETION OF THE END POINT ASSESSMENT

All EPA methods must be passed for the EPA to be passed overall.

## 17. POLICIES & PROCEDURES

PIABC Limited policies and procedures are made available to employers, training providers and apprentices once the Service Level Agreement has been agreed.

List of End Point Assessment Service's policies and procedures:

- Anti-fraud Policy
- Complaints Handling Policy
- Conflict of Interest Policy
- English and Mathematics Policy and Guidance for End Point Assessment Gateway Evidence
- Enquiries and Appeals Policy
- Equality, Diversity, Inclusion and Discrimination Policy
- Fair Access Policy
- Fees and Cancellations Policy
- Internal Quality Assurance Policy
- Invigilation Policy
- Malpractice and Maladministration Policy
- Prevent Agenda Policy
- Reasonable Adjustments Policy
- Safeguarding and Disclosure and Barring Service (DBS) Policy
- Sanctions Policy
- The Appeals Process (for Appeals against PIABC Limited decisions)
- Whistleblowing Policy

Copies of these policies and procedures are available from the EPA Team.

## 18. CONTACT DETAILS

If you have any queries about the contents of the specification, then please contact the EPA team at:

Email: [piabc@iom3.org](mailto:piabc@iom3.org)

Telephone: +44 (0)1476 513884

Post:

PIABC Limited  
The Boilerhouse  
Caunt Road  
Grantham  
NG31 7FZ

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