



Level 6 Materials Science Technologist (Degree) Apprenticeship (ST0675)

AM2: Professional Discussion Guidance

Version 1

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INTRODUCTION

This assessment will take the form of a professional discussion, which must be appropriately structured to draw out the best of the apprentice's competence and excellence and cover the knowledge, skills and behaviours (KSBs) assigned to this assessment method. It will involve questions that will focus on analysis of given scenarios, coverage of prior learning or activity, problem solving.

The rationale for this assessment method is:

- It allows the apprentice to be assessed against KSBs that do not naturally occur in the project
- It allows for testing of responses where there are a number of potential answers that couldn't be tested through the multiple-choice test
- It is a cost effective for employers, as apart from a venue, it does not require additional resources
- It replicates the sort of discussion occupationally competent employees regularly undertake

KNOWLEDGE, SKILLS AND BEHAVIOURS (KSBs)

The Level 6 Materials Science Technologist (Degree) apprenticeship standard states that all apprentices will need to develop specialist KSBs.

The KSBs of the of the Level 6 Materials Science Technologist (Degree) apprenticeship standard are set out below for Assessment Method 2 (AM2):

Knowledge

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

- K4** Current design and production of composite materials and additive manufacturing with the ability to engage with and evaluate complex theories and processes.
- K5** Bonding technologies utilising, for example, metals, ceramics, polymers, rubbers and glasses and full understanding of positive and negative interactions between materials.
- K6** Material component forming methods and how these contribute to effective production methods, problem solving innovations, and novel product development.
- K11** How engineering materials are manufactured and processed including understanding of UK and international materials standards, procedures and specifications across a range of operations and contexts.
- K14** How IT and emerging digital technologies such as 3D printing can be applied to enhance materials science work practices.
- K18** Up-to-date ethical and environmental impact of materials science applications and innovations.

Skills

A Materials Science Technologist will be asked to demonstrate skills in the following:

- S4** Conduct and interpret failure analysis of engineering components using relevant methodologies and systems such as but not limited to, for example, microscopy, macroscopy, and chemical analysis.
- S7** Interpret, develop and implement UK and international materials standards, procedures and specifications across a range of operations and contexts.

- S9** Utilise emotional intelligence and identify a range of supervisory, management, and leadership skills in developing the ability to mentor, direct or lead teams or individuals.

Behaviours

A Materials Science Technologist will be asked to demonstrate the following behaviours:

- B1** Self-starter committed to continuing professional and personal development, refreshing and expanding knowledge of materials science and technology through a variety of methods.
- B3** Respond to others' feelings with emotional intelligence and take responsibility for work areas, people, and resources within their remit.
- B6** Anticipate situations and problems, finds appropriate contemporary solutions and grasps opportunities.
- B8** Recognise interdependencies and combine commercial and technical sensibility to assist employer/client in capitalising on opportunities exercising broad autonomy and refined judgement.
- B10** Health and safety conscious at all times – strict adherence to regulations, incorporating up-to-date knowledge into planning.
- B11** Data hygienic and security sensitive when handling employer or client data.

DELIVERY

The independent assessor will conduct and assess the professional discussion.

The professional discussion will last for 60 minutes. The independent assessor has the discretion to increase the time of the professional discussion by up to 10% to allow the apprentice to complete their last answer. Further time may be granted for apprentices with appropriate needs, in-line with PIABC Limited's "*Reasonable Adjustments Policy*".

The professional discussion will be conducted as a 1:1 conversation in an appropriate environment (a quiet room free from distraction and influence).

The professional discussion will be appropriately structure to draw out the best of the apprentice's competence. Apprentices must be assessed against the KSBs assigned to this assignment method (see Assessment Descriptors below).

The independent assessor will ask a minimum of 9 open questions from PIABC Limited's question bank to ensure consistency in approach. Follow up questions will then be used to draw out further probe the responses.

The set of questions can have an order decided at the discretion of the independent assessor, but will cover three main areas:

1. Prior learning and/or work-based questions
2. The posing of realistic hypothetical scenarios requiring a judgement, challenge, or assessment
3. Problem solving questions.

There will be three questions in each of these areas.

Questions must cover the following topics:

1. The materials engineering environment and current challenges within manufacturing and product development

2. The impact of materials on operational delivery and manufacturing
3. Leadership and working with others in materials science
4. Developments and opportunities offered by materials innovation.

These topics must allow the apprentice opportunity to demonstrate the KSBs mapped to this assessment method.

The evidence will be captured using documentation produced by PIABC Limited by the independent assessor and the professional discussion will be recorded.

PROFESSIONAL DISCUSSION

A professional discussion is a structured conversation between the apprentice and independent assessor. It is an in-depth, planned, two-way discussion pitched at the relevant standard level.

It provides a holistic approach to assessing knowledge and understanding and is useful in determining not only what and how apprentice is performing, but also their analytical and decision-making abilities. It is used to test the validity and reliability of apprentice's evidence.

Typically, the professional discussion is an opportunity for apprentice to describe their apprenticeship journey and explain how the apprentice have applied their learning and developed their professional behaviours.

Apprentice is expected to understand and use relevant occupational language.

The independent assessor's role is to manage the process to allow apprentice to prove their KSBs in a supported environment, but without the independent assessor constantly directing and leading the conversation. During the discussion, the independent assessor may use several techniques to ensure the discussion remains focused and effective (i.e. periodically summarising points covered, questioning to probe for more information or to clarify certain points of the discussion).

At the beginning of the discussion the independent assessor is likely to be doing most of the talking (i.e. reiterating the reason for the discussion and agreeing how the main points of the discussion will be assessed and recorded etc.). However, as the discussion progresses, there should be a gradual 'handing over' to allow the apprentice to enter a full discussion where the apprentice have the opportunity of doing most of the talking.

The evidence presented by apprentice in the professional discussion must be valid, current, authentic, sufficient, and relevant to the relevant standard. By this PIABC Limited mean:

- **Valid:** Relevant and appropriate to meet the relevant KSBs criteria.
- **Current:** The evidence used has been produced during the time the apprentice has been on the apprenticeship.
- **Authentic:** The evidence can be identified as the individual apprentice's own work and not that of someone else or a group of people. If produced by the apprentice, if evidence is team-based it must be able to clearly identify the apprentice's contribution
- **Sufficient:** There is enough evidence to be certain that performance to the required standard is consistent and could be achieved on more than one occasion.
- **Relevant:** There is a clear match between the item of evidence and the required KSBs criteria.

ON THE DAY

- **Dress code**
Apprentices are expected to look smart on the day of the professional discussion. This must be in accordance with health and safety requirements of the venue (e.g. no open toe shoes).
- **Identification confirmation**
Apprentices must bring personal photographic identification (e.g. passport or driving licence), which will be checked before the professional discussion.
- **Mobile phones and tablets**
The use of mobile phones and other electronic devices at the professional discussion by the apprentice is prohibited.
- **Punctuality and timing**
All apprentices must be on time for the start of their professional discussion. 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 training provider as soon as possible so the panel is aware.

VENUE

PIABC Limited will ensure that the professional discussion is conducted in a suitable controlled environment in any of the following:

- Employer's premises
- Other suitable venue selected by PIABC Limited (e.g. at training provider location or PIABC Limited office)
- On-line using video conference facilities

The professional discussion will take place in a quiet room, free from distractions and influence. Video conferencing can be used to conduct the professional discussion, but the EPAO must have processes in place to verify the identity of the apprentice and ensure the apprentice is not being aided in some way, and as outlined earlier in the plan.

If video conferencing is used to conduct the professional discussion, then PIABC Limited will conduct it to ensure verification of the identity of the apprentice can be made and that the apprentice is not being aided in any way during the discussion.

ASSESSMENT DESCRIPTORS

Apprentices will only be assessed on KSBs mapped this assessment method.

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 full grading descriptors for Assessment Method 2 (AM2) are:

GROUPING	PASS CRITERIA	DISTINCTION CRITERIA
Design and production K4, K11, S7	To achieve a pass all of the pass criteria must be met: Describes current design and production processes which underpin production and manufacture of composite material and additive manufacturing, including the UK and international standards and procedures that apply to each. Illustrates with 2 examples.	To achieve a distinction, all of the pass criteria must be met, plus at least 6 of the 8 distinction boxes must be fully achieved: Compares and evaluates alternative approaches, describing their relative merits and limitations.
Bonding technology K5	Explains the positive and negative reactions that can occur during bonding, using two examples.	Explains ways to mitigate or rectify negative reactions.
Material components K6, K18, B6, B8	Demonstrates an understanding of material component forming methods and explains how these contribute to effective production methods, problem solving innovations and novel production development, with an example for each. Describes the ethical and environmental impact of their solutions.	Articulates a range of impacts of component forming regimens and real and likely impact of choices made in their own experience and practice.

GROUPING	PASS CRITERIA	DISTINCTION CRITERIA
Digital technology K14	Demonstrates an understanding of how new and emerging IT technologies are being applied to materials science work.	Compares and contrasts the traditional method of work with the new technological approach, highlighting benefits, drawbacks and risks
Failure analysis S4	Demonstrates that they can conduct and interpret failure analysis of an engineering component using relevant methodologies.	Interprets and incorporates results into forward-thinking and articulates tangible examples of how their analyses have affected production procedures.
Working with others S9, B3	Describes the range of supervisory, management and leadership skills they have deployed when mentoring or directing others. Provides a minimum of two examples. Provides an example of when they have responded to others' feelings with emotional intelligence.	Justifies their approach and explains alternative solutions and their reasons for disregarding them.

GROUPING	PASS CRITERIA	DISTINCTION CRITERIA
Continuous Professional Development B1	Projects self-confidence in their ability to articulate how CPD has been and will continue to inform their working practices.	Projects a dynamic demeanor in terms of how CPD has been inextricably linked to their success and will continue to be vital in informing and underpinning their working practices.
Health and safety B10	Clearly articulates the importance of safe working practices, with reference to appropriate regulation.	Verbalises the efficacy of H&S regulation via direct experiences in testing, production, and innovation.
Data Control B11	Describes the importance of handling employer and client data sensitively, with reference to legislation and an explanation of the risks and implications of getting this wrong.	

GRADING

The following grading is for Assessment Method 2:

KSBs	Fail	Pass	Distinction
K4 K5 K6 K11 K14 K18 S4 S7 S9 B1 B3 B6 B8 B10 B11	The apprentice will be deemed to have failed the assessment method if they do not meet the criteria outlined in the pass descriptor.	In order to achieve a "pass" all of the pass descriptors mapped to this assessment method must be met.	In order to achieve a "distinction", the candidate must meet at least 6 of the 8 distinction criteria mapped against this assessment method.

The independent assessor will make all grading decisions.

SUCCESSFUL COMPLETION OF THE END POINT ASSESSMENT

For an apprentice to pass the end point assessment (EPA) as a whole and be deemed to be competent, the apprentice must pass all assessment methods (AM1: Work-Based Project, AM2: Professional Discussion and the AM3: Knowledge Test).

Should the apprentice fail either AM1, AM2 or AM3 they are required to re-sit/re-take that component. The number of times an apprentice is permitted to re-sit/re-take the end point assessment and the date at which they do so is determined by the employer.