

End-point assessment plan for Tool process design engineer apprenticeship standard

Apprenticeship standard number	Apprenticeship standard level	Integrated end-point assessment
ST0641	6	No

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Introduction and overview

This document sets out the requirements for end-point assessment (EPA) for the Tool process design engineer apprenticeship standard. It is for end-point assessment organisations (EPAOs) who need to know how EPA for this apprenticeship must operate. It will also be of interest to Tool process design engineer apprentices, their employers and training providers.

Full time apprentices will typically spend 48 months on-programme (before the gateway) working towards the occupational standard, with a minimum of 20% off-the-job training. All apprentices must spend a minimum of 12 months on-programme.

The EPA period should only start, and the EPA be arranged, once the employer is satisfied that the apprentice is deemed to be consistently working at or above the level set out in the occupational standard, all of the pre-requisite gateway requirements for EPA have been met and can be evidenced to an EPAO.

All pre-requisites for EPA assessment methods must also be complete and available for the assessor as necessary.

For level 3 apprenticeships and above apprentices without English and mathematics at level 2 must achieve level 2 prior to taking their EPA.

The EPA must be completed within an EPA period lasting typically eight-months, after the EPA gateway.

The EPA consists of two discrete assessment methods.

The individual assessment methods will have the following grades:

Assessment method 1: Work Based Project with report, presentation and questioning.

- Fail
- Pass
- Distinction

Assessment method 2: Professional Discussion underpinned by portfolio

- Fail
- Pass
- Distinction

Performance in the EPA will determine the overall apprenticeship standard grade of:

- Fail
- Pass
- Merit
- Distinction

EPA summary table

<p>On-programme (typically 48 months)</p>	<ul style="list-style-type: none"> • Training to develop the occupation standard's knowledge, skills and behaviours (KSBs). • Working towards English and Maths at level 2 if required • Compilation of a portfolio of evidence
<p>End-point assessment gateway</p>	<ul style="list-style-type: none"> • Employer is satisfied the apprentice is consistently working at, or above, the level of the occupational standard. • English and mathematics Level 2 as a minimum • EPAO and employer must agree the subject title and scope of the project to be used in Assessment Method 1, and ensure it allows sufficient opportunity for the apprentice to demonstrate the KSBs mapped to this assessment method <p>Apprentices must complete:</p> <ul style="list-style-type: none"> • Portfolio of evidence to underpin the relevant KSBs for professional discussion. This must be signed by the employer to confirm that this is the apprentices own work.
<p>End-point assessment (which will typically take eight months)</p>	<p>Assessment Method 1: Work Based Project with report, presentation and questioning.</p> <p>With the following grades:</p> <ul style="list-style-type: none"> - Fail - Pass - Distinction <p>Assessment Method 2: Professional Discussion underpinned by portfolio</p> <p>With the following grades:</p> <ul style="list-style-type: none"> - Fail - Pass

	<ul style="list-style-type: none">- Distinction <p>Overall end point assessment grade of:</p> <ul style="list-style-type: none">- Fail- Pass- Merit- Distinction
Professional recognition	<p>Aligns with recognition by:</p> <ul style="list-style-type: none">• Institute of Mechanical Engineers (IMechE) <p>IMechE: This Apprenticeship Standard aligns with the current edition of the UK Standard for Professional Engineering Competence (UK-SPEC) at Incorporated Engineering (IEng) level</p>

Length of end-point assessment period

The EPA will be completed within an EPA period lasting typically eight months, beginning when the EPAO confirms that the apprentice has passed the End Point Assessment gateway.

Any supporting material required for the EPA should be submitted at the gateway. If an EPA assessment method is failed, it should be resat/retaken within the EPA period and in-line with the requirements set out in this assessment plan.

Order of assessment methods

The assessment methods can be delivered in any order allowing EPAO flexibility in scheduling and cost-effective allocation of resources. The result of one assessment method does not need to be known before taking the next.

Gateway

The EPA period should only start once the employer is satisfied that the apprentice is consistently working at or above the level set out in the occupational standard, that is to say they are deemed to have achieved occupational competence. In making this decision, the employer may take advice from the apprentice's training provider(s), but the decision must ultimately be made solely by the employer.

In addition to the employer's confirmation that the apprentice is working at or above the level in the occupational standard, the apprentice must have completed the following gateway requirements prior to beginning EPA:

- English and mathematics at level 2.

For those with an education, health and care plan or a legacy statement the apprenticeships English and mathematics minimum requirement is Entry Level 3 and British Sign Language qualification are an alternative to English qualifications for whom this is their primary language.

Project report requirements (Assessment method 1 Component 1) - Work Based Project with Report

The employer and EPAO must have agreed a project subject, title and scope at the gateway

- The aim of the project must be to demonstrate the design of a unique tooling process that enables components to be mass produced in the most economically, viable way.
- In order to ensure the scope of the project ensures appropriate coverage of the KSBs assigned to this assessment method the detail of the project must include:
 1. Background to the project topic
 2. Outline of the issue or opportunity
 3. Justification for the project
 4. Evidence of effective research
 5. Potential benefits (cost saving, improved productivity, quality) and drawbacks including commercial, contractual and organisational etc.
 6. Potential risks
 7. Consideration of legislation, regulation, industry and organisational policies, procedures and requirements

8. Proposed plan for implementation and work breakdown structure
9. Clarification of Stakeholder relationships and Stakeholder engagement
10. Measures of success

Project report requirements (Assessment Method 1 Component 2) Presentation and questioning

No specific requirements

Portfolio requirements (Assessment Method 2) Professional Discussion underpinned by portfolio

The apprentice will be required to:

- Prepare and submit a portfolio compiled throughout the apprenticeship and completed by the gateway.
- The portfolio must be sufficient to evidence that the apprentice can apply the knowledge, skills and behaviours required as mapped to Assessment Method 2 (AM2). There must be at least one piece of evidence relating to each knowledge, skill and behaviour mapped to AM2 although in most cases one piece of evidence will be referenced against more than one KSB requirement.
- Each piece of evidence may map to more than one KSB, this will typically result in 12 pieces of evidence to cover all KSBs listed.
- The portfolio can include evidence sources such as work product artefacts, for example risk assessments, reports, meeting records, plans and costings. Any contributions from others, for example witness statements and reviews, should focus on direct observation of evidence of competence rather than opinion. Records of learning activities targeting their own performance, can support demonstration of behaviour B4. This list is not definitive and other evidence sources are allowable.
- the employer must sign off the portfolio of evidence, thereby authenticating it. The portfolio of evidence itself is not assessed; it is used to inform the questioning for the occupational competence professional discussion
- employers/training providers are free to devise their own template version of the portfolio of evidence, but the portfolio of evidence would typically contain the following information:
 - The name of the apprentice

- Details of the apprentice's workplace
- Sufficient evidence to support each of the KSBs related to this assessment method. Evidence can be provided through a range of sources as described above. The portfolio will not be directly assessed.
- The portfolio should contain written accounts of activities that have been completed and referenced against the knowledge, skills and behaviours, supported by appropriate evidence. The portfolio should focus on providing evidence of a qualitative not quantitative value.
- The portfolio of evidence cannot include self-assessment narrative, other than records of learning activities targeting their own professional development; instead feedback from line managers, customers, stakeholder etc. should be provided. Ideally, any employer contributions should focus on direct observation of evidence (e.g. witness statements) of competence rather than opinions
- Confirmation from the apprentice's line manager that the tasks were completed to the required standard of the organisation
- The apprentice's manager/mentor will typically support the development of the portfolio in accordance with organisational policy and procedures, although the EPAO will provide further guidance on the content.
- The portfolio produced must be the apprentice's work only; employer support should not extend to any direct contributions to the collation or production of the portfolio.
- The portfolio, and therefore the evidence gathered, can take the form of either paper based or electronic content

Assessment methods

Assessment method 1: Work Based Project with report, presentation and questioning.

This assessment method has two components:

- 1) work based project with report
- 2) presentation and questioning.

Evidence from the different components (project with report, presentation and questioning) will be assessed holistically against the KSBs mapped to this assessment method.

Assessment Method 1 Component 1: Work Based Project with report

Overview

The work-based project report is compiled after the apprentice has gone through the Gateway process.

The project report must be based on the work-based project activities that the apprentice has completed during the EPA period. This may be in one project activity or a number of sub-project activities.

Apprentices must produce a report of 8,000 words excluding references, appendices and diagrams based on the work-based project activities. A tolerance of plus or minus 10% on the word count is allowed

The purpose of the project is to demonstrate the design of a unique tooling process that enables components to be mass produced in the most economically, viable way. To be fully competent, the apprentice must prove their ability to plan and deliver such projects, taking account of technical issues, necessary compliance frameworks, budgetary and time constraints, safety and the quality of the final delivery.

The work-based project should be designed to ensure that the apprentice's work meets the needs of the business, is relevant to their role and allows the relevant KSBs to be demonstrated for the EPA. Therefore, the project's subject, title and scope will be agreed between the employer and the EPAO at gateway. The employer will ensure it has a real business application and the EPAO will ensure it meets the requirements of the EPA (including suitable coverage of the KSBs assigned to this assessment method). Where a number of project activities are used the Project Report should include all Project Report headings required as specified in the EPA clearly showing which sub-project activity has been mapped to those headings. The EPAO should sign-off the project title to confirm its suitability at the Gateway.

The rationale for this assessment method is:

This is a typical activity within this complex occupation and will have a business benefit. It allows the end-point assessor to ascertain the competence level of an apprentice against the context of real experiences in automation environments.

In order to improve adoption by SME employers, multiple smaller sub-projects can be included in one overarching report as a means of covering all KSBs required. The EPAO will ensure comparability across multiple sub-projects. This should be restricted to a maximum of 3 sub-projects. The project report headings as set out in the EPA document need only to be covered once in the overarching project report whether one project activity or a number of sub-project activities is undertaken.

Workplace observation would not be suitable for this assessment method as some of the project activities are sporadic and vary in time (both short and long duration activities), that are difficult to synchronise with an observation visit. This component is a valid way to assess the evidence of these activities.

Delivery

Apprentices will conduct a project in the form of an employment-based project or group of sub-projects (maximum of 3) and the delivery outcomes will be in the form of a summary report. This may be in paper or electronic format.

The project is compiled after the apprentice has gone through the Gateway process.

The apprentice will conduct their project and submit the report to the EPAO after a maximum of 26 weeks of the EPA start date.

The employer must ensure the apprentice has sufficient time and the necessary resources, within this period, to plan and undertake the project.

The apprentice must complete the project report and submit this and the presentation by or before the end of week 26 of their EPA period. The independent assessor must review the project report prior to the presentation at a date, time and location agreed with the employer. This must be a minimum of 10 working days prior to the presentation taking place..

Whilst completing the project, the apprentice must be supervised by the employer.

Supervision should also include the allowance of the apprentice sufficient time away from regular duties to complete the written requirement of the project (e.g. report and presentation).

The project may be based on any of the following:

- a specific problem
- an idea/opportunity
- client/stakeholder (internal or external) requirement

The purpose of the project is to design a unique tooling process that enables components to be mass produced in the most economically, viable way.

The workplace project report should be no longer than 8,000 words. A tolerance of plus or minus 10% is allowed. Appendices, references, diagrams etc. will not be included in this total.

As a minimum all reports must include:

1. An introduction
2. The scope of the project (including key performance indicators, the objective, responsibilities and time scale)
3. A project plan
4. Scope of Team/Teamwork
5. Research and findings, including innovation.
6. Project/activity delivery
7. Cost breakdown and consideration of financial options
8. Project outcomes including operational problems overcome
9. How the outcomes were achieved by reference to PPAP (Production Part Approval Process). APQP (Advanced Production Quality Planning) APQP PPAP FMEA (Failure Mode and Effects Analysis) and 5S Engineering systems documentation created in the project
10. Recommendations and conclusions
11. An appendix mapping how the project evidences each of the relevant KSB's for this assessment method.

Where sub-projects have been used the apprentice must ensure that each heading is covered within the sub-projects holistically. It is not expected that each heading will be covered by each sub-project.

The appendix must also include a signed statement from the employer authenticating the apprentice's evidence.

It is important that the apprentice carefully selects the evidence to be used to support the project report and only includes relevant evidence.

The independent assessor must review the report prior to the presentation taking place. Typically, this will be a minimum of 10 working days prior to the presentation with questioning.

In certain circumstances, depending on the nature of the business/department where the apprentice is employed, the report may not be allowed to leave the premises and/or in certain cases the information in the report may be redacted for confidentiality reasons. Should the report not be allowed to leave the premises the assessor must review the project report at the employer's premises within 10 working days of the project report being completed.

The EPAO and their independent assessors may also be required to sign a confidentiality/non-disclosure agreement with the apprentice's employer.

Marking

The independent assessor will review and mark the project in a timely manner, as determined by the EPAO, and without extending the EPA unnecessarily. Similarly all quality control processes will also be conducted in a timely manner, as determined by the EPAO.

The Work-based Project Report must be submitted to the EPAO at least 10 days before the Work-based Project presentation with questioning to allow the assessor time to review the report.

The project, report and presentation with questioning will be marked as a single piece of work and compensation can be allowed whereby evidence can be considered and drawn from either project or presentation.

Required Supporting material

EPAOs will produce the following material to support this assessment method:

1. Marking scheme.
2. Data capture forms for results and evidence including gaps, mapped against the KSBs
3. Guidance document on how employers can assist in determining suitable project/activity content.
4. Guidance document for both apprentices and employers as to how the assessment method will be administered, including timescales and deadlines.
5. Examples of project titles

Assessment Method 1 Component 2: Presentation with questioning

Overview

Apprentices will prepare and deliver a presentation that appropriately covers the KSBs assigned to this method of assessment.

The presentation will be based on the project carried out in Component 1 and will cover a summary of the project and report to include:

1. An introduction

2. The scope of the project and which project/activities are being presented
3. Description of the role of the apprentice in these activities
4. How the outcomes were achieved by the apprentice by reference to PPAP (Production Part Approval Process). APQP (Advanced Production Quality Planning) FMEA (Failure Mode and Effects Analysis) and 5S Engineering systems documentation created in the project
5. Research and findings, including innovation.
6. Project outcomes including operational problems overcome and lessons learned
7. Recommendations and conclusions

The independent assessor must review any presentation materials prior to the presentation at a date, time and location agreed with the employer. This must be a minimum of 10 working days prior to the presentation taking place and submitted along with the report.

The project report and supporting evidence must be available throughout the duration of the presentation and questioning components so that it can be referenced by the independent assessor and/or apprentice.

The apprentice should have a minimum of 10 working days notice of the date and time of the presentation and questioning component once the independent assessor has completed their review.

The apprentices can use a range of aids to support the presentation, such as flip charts, video clips, work products/outputs and Power Points.

The presentation will be presented to an independent assessor, either face-to-face or via online video conferencing. If using an online platform, EPAOs must ensure appropriate measures are in place to prevent misrepresentation and ensure confidentiality.

The rationale for this assessment method is that the Tool process design engineer occupation involves reporting the results and potential consequences of various design approaches to clients and internal stakeholders. To be fully competent, the apprentice must prove their ability to communicate the outcome of such design activity to appropriate stakeholders. This method facilitates the assessment of multiple KSBs across a range of duties carried out across the workplace. This method of assessment allows the end-point assessor to ascertain the competence level of an apprentice against the context of real experiences in the work environment. This component complements the project report component as it allows the apprentice to provide more clarity around the report and give the assessor the opportunity to probe and clarify issues.

Delivery

The presentation and questioning will last for 60 minutes in total. This will typically be a 30-minute presentation followed by 30 minutes of questions. The assessor has the

discretion to increase the time of both the presentation and the questioning by up to 10% to allow the apprentice to complete their last point.

The independent assessor will ask a minimum of 5 questions at the end of the presentation. The questions will be drawn from the review of the project report and a question bank supplied by the EPAO (but can be adapted to meet the circumstances of the individual's project and presentation), to confirm the independent assessor's understanding of the presentation and how it demonstrates the relevant knowledge, skills and behaviours.

The presentation must be prepared as if they were being delivered to the apprentice's employer project board or customers. They should be succinct, addressing the main points of the proposal rather than the fine detail.

To deliver the presentation, the apprentice will have access to:

- PowerPoint
- flip chart
- videos
- interactive demonstrations
- notes
- computer

The presentation will be conducted as follows:

- The presentation would normally be conducted face-to-face on a one-to-one basis between the apprentice and the independent assessor.
- The use of live video conferencing is allowed subject to the controls outlined below.

The independent assessor will make all grading decisions.

Venue

EPAOs must ensure that the presentation and questioning elements are conducted in a suitable controlled environment in any of the following:

- employer's premises
- other suitable venue selected by the EPAO (e.g. a training provider)

The venue should be a quiet room, free from distraction and external influence.

The assessment will usually be face-to-face, but video-conferencing (or similar technology) is acceptable if the apprentice, the employer and the assessor all agree this is appropriate, and robust technology is in place to ensure the apprentice is not disadvantaged. EPAOs must ensure appropriate measures are in place to prevent

misrepresentation, for example, screen share and 360-degree camera function with assessors when the assessments are undertaken remotely.

Supporting material

EPAOs will produce the following materials to ensure that this assessment method is marked consistently and accurately:

1. Marking scheme.
2. Data capture forms for results and evidence including gaps, mapped against the KSBs.
3. Guidance document for both apprentices and employers as to how the assessment method will be administered, including timescales and deadlines.
4. EPAOs must develop a bank of sample questions which can be used and contextualised by independent assessors during the questioning. The independent assessor can develop/adapt questions based on their review of the report, presentation and supporting evidence. This bank of questions should be large enough to prevent predictability including in the event of re-sits and retakes. Annual review of the questions should take place to ensure suitability.

Assessment method 2: Professional Discussion underpinned by portfolio

This assessment method has one component: Professional discussion underpinned by a portfolio of evidence

Overview

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 KSBs assigned to this assessment method. It will involve a two-way discussion to allow the apprentice the opportunity to demonstrate occupational competence against the KSBs mapped to this method of assessment.

The professional discussion can take place in any of the following:

- employer's premises
- a suitable venue selected by the EPAO (e.g. a training provider's premises)

The assessment will usually be face-to-face, but video-conferencing (or similar technology) is acceptable if the apprentice, the employer and the assessor all agree this is appropriate, and robust technology is in place to ensure the apprentice is not disadvantaged. EPAOs must ensure appropriate measures are in place to prevent misrepresentation, for example, screen share and 360-degree camera function with assessors when the assessments are undertaken remotely.

The rationale for this assessment method is to determine the extent to which the apprentice understands the requirements of the role and can corroborate their KSBs with examples from their portfolio of evidence. It allows for knowledge and behaviours that may not naturally occur as part of other assessment methods to be assessed. It makes use of naturally occurring evidence and complements the other assessment methods that are written, and presentation based.

The portfolio of evidence itself will not be assessed but will be used by the apprentice to exemplify their responses to the questions asked by the independent assessor during the interview.

This is a holistic method of assessment of multiple KSB's across a range of duties carried out through work-based projects or engineering activities. It is intended that this method of assessment allows the end-point assessor to ascertain the competence level of an apprentice against the context of real experiences in automation environments.

The discussion allows the assessor to explore the breadth and depth of the apprentices understanding not available through other available assessment methods.

This method of assessment gives the independent assessor the opportunity to explore KSBs in detail and ensure all relevant competency elements are evidenced. It is also the most effective way of determining competence for the majority of the behavioural elements of this standard.

Delivery

The independent assessor will conduct and assess the professional discussion supported by a portfolio of evidence.

The professional discussion must 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 the EPAO's Reasonable Adjustment policy.

During this method, the independent assessor must ask a minimum of ten open questions. They will combine questions from the EPAO's question bank and those generated by themselves from a review of the portfolio of evidence.

The professional discussion will be conducted as set out here:

- The professional discussion must take place on a one-to-one basis between an independent end-point assessor appointed by the EPAO and the apprentice.
- Questions must be created that test the KSBs mapped to this assessment method and relate to evidence provided in the portfolio.
- Both apprentice and independent assessor should have a copy of the portfolio to hand during the discussion and can refer to this at any time.
- A copy of the portfolio of evidence shall be made available to the end-point assessment organisation at the gateway.
- Apprentices must be given the opportunity to refer to their portfolio of evidence during the professional discussion.
- The apprentice shall be given suitable notice of the professional discussion, not less than 10 working days, to provide preparation time (for example, to make travel arrangements if necessary).
- Independent assessors must ask apprentices a minimum of ten open questions, from a question bank prepared by the EPAO, covering underpinning KSBs as specified in the mapping document. Supplementary questions are allowed to seek clarification, and these can be generated by the end-point assessor in response to portfolio content.
- The independent assessor must use the assessment tools and procedures that are set by the EPAO to record the professional discussion.
- 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. e.g. use of a 360 degree camera to allow the assessor to look around the room during the interview.

The independent end-point assessor must:

- Plan the Professional Discussion (underpinned by a portfolio of evidence) prior to it taking place and ensure that it is relevant to the standard.

- Ensure that the apprentice understands the process, the possible outcomes and how it is graded.
- Ensure they take steps to put the apprentice at ease.
- Ensure that he/she has the grading criteria and relevant documentation to hand before commencing the professional discussion (underpinned by the portfolio of evidence).
- Complete the relevant documentation prepared by the EPAO to record the outcome of the Professional Discussion, taking notes of what is said to provide evidence of content of the discussion.
- Ensure that the outcome of assessment is notified to the EPAO within the timescale set by them.
- EPAOs must ensure that apprentices have a different set of questions in the case of re-sits/re-takes.
- Independent assessors must be developed and trained by the EPAO in the conduct of discussions and reaching consistent judgement.
- Ensure any special needs highlighted by the employer and training provider are taken into consideration in line with the EPAO's Reasonable Adjustments policy.
- The independent assessor will make all grading decisions.

Venue

The professional discussion should take place in a quiet room, free from distractions and influence.

Other relevant information

A question bank must be developed by EPAOs. The 'question bank' must be of sufficient size to prevent predictability and the EPAO must review it regularly (and at least once a year) to ensure that it, and its content, are fit for purpose. The specifications, including questions relating to the underpinning knowledge, skills and behaviours, must be varied yet allow assessment of the relevant KSBs.

EPAOs must ensure that apprentices have a different set of questions in the case of re-sits/re-takes.

Independent assessors must be developed and trained by the EPAO in the conduct of professional discussion and reaching consistent judgement.

EPAOs will produce the following material to support this assessment method:

1. Marking scheme.
2. Data capture forms for results and evidence including gaps, mapped against the KSB's.
3. Guidance document for both apprentices and employers as to how the assessment method will be administered, including timescales and deadlines.
4. A question bank of sample questions, although independent assessors will need to tailor questions according to the work seen in the portfolio of evidence. Such tailoring shall be to account for the type of organisation that the apprentice works for (for example: large business, Small or Medium Enterprise) and the type and purpose of tools that the apprentice has been working on, during compilation of the portfolio. The question bank should be of sufficient size to prevent predictability and be reviewed regularly (at least once a year) to ensure the questions are fit for purpose.

Reasonable adjustments

The EPAO must have in place clear and fair arrangements for making reasonable adjustments for this apprenticeship standard. This should include how an apprentice qualifies for reasonable adjustment and what reasonable adjustments will be made. The adjustments must maintain the validity, reliability and integrity of the assessment methods outlined in this assessment plan.

Weighting of assessment methods

All assessment methods are weighted equally.

Grading

Overall EPA grading

Performance in the EPA will determine the apprenticeship grade of fail, pass, merit, or distinction.

Independent assessors must individually grade each assessment method, according to the requirements set out in this plan.

EPAOs must combine the individual assessment method grades to determine the overall EPA grade.

Apprentices who fail one or both assessment methods will be awarded an overall EPA 'fail.'

In order to gain an overall EPA 'pass' apprentices must achieve a pass in both assessment methods.

In order to achieve an overall EPA 'distinction' apprentices must achieve a distinction in the Work Based Project with report, presentation and questioning and Professional Discussion underpinned by portfolio of evidence.

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

Assessment method 1	Assessment method 2	Overall grading
Work Based Project with Report, Presentation and Questioning	Professional Discussion underpinned by Portfolio	
Fail	Any grade	Fail
Any grade	Fail	Fail
Pass	Pass	Pass
Pass	Distinction	Merit
Distinction	Pass	Merit
Distinction	Distinction	Distinction

Re-sits and re-takes

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

Resits and retakes should typically be taken within 7 months of the fail notification, otherwise the entire EPA must be taken again, unless in the opinion of the EPAO exceptional circumstances apply outside the control of the apprentice or their employer.

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

Roles and responsibilities

Role	Responsibility
Apprentice	<ul style="list-style-type: none"> • participate in development opportunities to improve their knowledge skills and behaviours as outlined in the standard • meet all gateway requirements when advised by the employer • understand the purpose and importance of EPA and undertake EPA
Employer	<ul style="list-style-type: none"> • support the apprentice to achieve the KSBs outlined in the standard to their best ability • determines when the apprentice is working at or above the level outlined in the standard and is ready for EPA • select the EPAO • confirm all EPA gateway requirements have been met • confirm arrangements with EPAO for the EPA (who, when, where) in a timely manner • ensure apprentice is well prepared for the EPA <ul style="list-style-type: none"> • Should not be involved in the delivery of the EPA
EPAO	<p>As a minimum EPAOs should:</p> <ul style="list-style-type: none"> • understand the occupational role • appoint administrators/invigilators and markers to administer/invigilate and mark the EPA • provide training and CPD to the independent assessors they employ to undertake the EPA • provide adequate information, advice and guidance documentation to enable apprentices, employers and providers to prepare for the EPA • deliver the end-point assessment outlined in this EPA plan in a timely manner • prepare and provide all required material and resources required for delivery of the EPA in-line with best practices • use appropriate assessment recording documentation to ensure a clear and auditable mechanism for providing assessment decision feedback to the apprentice • have no direct connection with the apprentice, their employer or training provider i.e. there must be no conflict of interest • maintain robust internal quality assurance (IQA) procedures and processes, and conducts these on a regular basis • conform to the requirements of the nominated external quality assurance body • organise standardisation events and activities in accordance with this plan's IQA section • organise and conduct moderation of independent assessors' marking in accordance with this plan

	<ul style="list-style-type: none"> • have, and operate, an appeals process • arrange for certification with the relevant training provider
Independent assessor	<p>As a minimum an independent assessor should:</p> <ul style="list-style-type: none"> • understand the standard and assessment plan • deliver the end-point assessment in-line with the EPA plan • comply to the IQA requirements of the EPAO • be independent of the apprentice, their employer and training provider(s) i.e. there must be no conflict of interest • satisfy the criteria outlined in this EPA plan • hold or be working towards an independent assessor qualification e.g. A1 and have had training from their EPAO in terms of good assessment practice, operating the assessment tools and grading • have the capability to assess the apprentice at this level • attend the required number of EPAOs standardisation and training events per year (as defined in the IQA section)
Training provider	<p>As a minimum the training provider should:</p> <ul style="list-style-type: none"> • work with the employer to ensure that the apprentice is given the opportunities to develop the KSBs outlined in the standard and monitor their progress during the on-programme period • advise the employer, upon request, on the apprentice's readiness for EPA prior to the gateway <p>• Plays no part in the EPA itself</p>

Internal Quality Assurance (IQA)

Internal quality assurance refers to the requirements that EPA organisations must have in place to ensure consistent (reliable) and accurate (valid) assessment decisions. EPA organisations for this EPA must:

- appoint independent assessors who have knowledge of the following occupational areas:

Tool process designing processes including, for example, strategic tool design, principles and practices of volume tolling processes and planning and forecasting outcomes as demonstrated within the Tool process design engineer Apprenticeship Specification.

- appoint independent assessors who are competent to deliver the end-point assessment and who meet the following minimum requirements:

- have recent relevant experience of the occupation/sector gained in the last two years or significant experience of the occupation/sector. This should be at least at the same level as the standard and be able to evidence recent CPD activities.
- provide training for independent assessors in terms of good assessment practice, operating the assessment tools and grading
- have robust quality assurance systems and procedures that support fair, reliable and consistent assessment across the organisation and over time.
- operate induction training and standardisation events for independent assessors when they begin working for the EPAO on this standard and before they deliver an updated assessment method for the first time
- ensure independent assessors attend standardisation events on an ongoing basis and at least once per year

Affordability

Affordability of the EPA will be aided by using at least some of the following practice:

- using an employer's premises
- using digital technology for End Point Assessment

Professional body recognition

Institute for Mechanical Engineers: This Apprenticeship Standard aligns with the current edition of the UK Standard for Professional Engineering Competence (UK-SPEC) at Incorporated Engineering (IEng) level. The experience gained and responsibility held by the apprentice on completion of the apprenticeship will either wholly or partially satisfy the requirements for IEng and reaches the agreed level of professional competence as defined in the Assessment Plan.

Reasonable adjustments

The EPAO must have in place clear and fair arrangements for making reasonable adjustments for this apprenticeship standard. This should include how an apprentice qualifies for Reasonable Adjustment and what Reasonable Adjustments will be made. The adjustments must maintain the validity, reliability and integrity of the assessment methods outlined in this assessment plan.

Annex A: Mapping of knowledge, skills and behaviours (KSBs)

Assessment method 1: Work Based Project with report, presentation and questioning.

Knowledge
K1 Strategic tool design including the principles and practices of toolmaking machine capability and the limitations of new press tools
K4 Applies business improvement processes and techniques, innovative ways of working and failure proofing techniques (for example Poke Yoke) to deliver a feasible and economically viable process
K7 Advanced lean manufacturing techniques including programme management, failure mode analysis, problem solving, advanced quality planning and single minute exchange of dies (SMED)
K8 Properties of materials including the metallurgical properties of various metals, for example, mild steel stainless steel and predicting the effect on the material during the tooling process
K9 Business Planning including project management, planning, forecasting, risk analysis, financial planning, commercial impact and contractual obligations, together with supply chain management, logistics and resource constraints
Skills
S2 Create new tooling solutions using specialist software programmes to produce 3 dimensional (3D) models
S3 Critically analyse, interpret and evaluate complex information and ideas to create the new tooling solution, using bespoke software programmes to create 3D models such as car seat chassis assemblies
S5 Undertake advanced forming simulation using computer aided equipment (CAE)
S6 Confirm feasibility and estimate the cost of volume component production including, gross material cost, labour costs, machine cost overheads, machine utilisation capacity (Takt time) capital expenditure and consumables and contribute to overall budget management.
S7 Design tooling solution to meet customer requirements including external specifications set by clients and original equipment manufacturers (OEMs) while fulfilling ethical and sustainability requirements.

S10 Provide timely succinct written reports that explains complex technical issues and potential consequences using language and phrases appropriate to the audience's knowledge and understanding.

Behaviours

B1 Strong work ethic with a positive attitude, motivated by engineering and business values for example: motivated by externally set challenges, accountable and persistent in completing tasks.

B2 Professionalism - dependable, ethical, responsible and reliable while consistently setting demanding personal targets

B6 Problem solving identifies issues quickly, enjoys solving complex problems at the root cause and applying appropriate solutions

B7 Quality focus that promotes continuous improvement and consistently applies logic to the design process

B9 Demonstrates a safety mind-set and promotes Health and Safety leadership to others at all times. This occupation sits within an industry with extensive and rigorous Power Press Regulation (PUWER) requiring a disciplined and responsible approach to manage, mitigate and avoid risk

Assessment method 2: Professional Discussion with portfolio

Knowledge

K2 How to design a new tooling process for volume production without inhibiting existing production demand using leadership and management techniques

K3 Planning and forecasting outcomes of new tooling processes including those where there is limited definition tooling processes

K5 Collaborative working including relationship management with clients, stakeholders and the supply chain by utilising negotiation, influencing and mutual problem-solving techniques.

K6 The scientific, technical, engineering and mathematical principles involved in creating the optimal manufacturing process design, including geometric dimensioning and tolerances allowing conceptualisation and refinement of the design and theoretical fixture behaviour

K10 Team formation and leadership including motivation, coaching and human resource development, preventing dysfunctional working using techniques such as emotional intelligence, conflict resolution and change management

K11 High volume sheet metal forming and cutting techniques in a continuous production environment taking into consideration industry requirements and regulations

Skills

S1 Design and trial volume press tooling processes including blanking, piercing, forming, draw forming, press tool components selection, ganged setup, progression tooling, transfer tooling, clamping, material selection and heat treatment

S4 Design and develop gap gauges, acceptance gauges including co-ordinate measuring machine (CMM) dimensional checking and 3D laser scanning for analysis and problem resolution

S8 Lead and manage a team to implement new tool process projects from their inception into full production, for example by using planning, organising team control and motivational techniques. Build on the ideas of others to improve outcomes.

S9 Communication and influencing techniques by choosing appropriate communication methods for the audience, ensuring understanding and delivering effective presentations and reports

Behaviours

B3 Team player works effectively within a team and supports others when required. In doing so, applies these behaviours in a respectful and professional manner

B4 Self-analytical, overcomes problems through a process of reflection and review and by undertaking continuous professional development (CPD) in order to use new technological advances in the sector

B5 Commits to the beliefs, goals and standards of their own employer and to the wider industry and its professional standards

B8 Resourceful and adjusts to different conditions and technologies through market research quickly while continuing to meet the tool process design criteria

Annex B: Grading criteria for knowledge, skills and behaviours (KSBs)

Assessment method 1: Work Based Project with report, presentation and questioning.

Fail – does not meet the pass criteria

Pass – meets all the pass criteria

Distinction – meets all the pass criteria and all the distinction criteria

KSBs	Pass	Distinction
<p>Technical Requirements - Principles and applications of tool design</p> <p>K1, K8</p> <p>S2, S5, S7</p> <p>B6, B9</p>	<p>Explains within the project how the proposed design solution(s) meets the technical requirements and how toolmaking machine and material capability/limitations were taken into account when making strategic design decisions</p> <p>The explanation should include a critical comparison of different tool processes and machine capability and limitation's when designing the tool process pathways within the project.</p> <p>For example:</p> <ol style="list-style-type: none"> 1) Cutting 2) Forming 3) Piercing 4) Deep Drawing 5) Manual 6) Automation K1 	<p>Evaluates potential alternative approaches to design strategy and solutions. Provides reasoned arguments for approach taken K1</p> <p>Analyses the commercial benefits of different uses of automated processes in contrast to manual processes in the wider industrial context beyond their specific project outcomes. K1</p> <p>Designs a Progression Tool in 3-dimensions for the same part to be included in the high volume tool process design solution. S2</p>

	<p>Produces effective high volume tooling solution(s) to meet project requirements supported by valid 3D models and simulation. S2</p> <p>Explains how the project considered how the tool design process impacts on the different uses of metals and their choice for different purposes and processes comparing manufacturing aluminium or mild steel components within the project. K8</p> <p>Produces Computer Aided Drawings using advanced forming simulation within the project. S5</p> <p>Describes how the project includes accurate, ethical and sustainable, interpretation of customer specifications and translates them into tooling solutions using scientific, engineering and mathematical approaches from inception to fully feasible and working design.S7</p> <p>Identifies complex problems and implements revisions required throughout the work project, demonstrating the end-to-end design process. B6</p>	
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	<p>Explains how identifying, managing and mitigating Health and Safety risk has been incorporated within the tool process design to ensure that the tool process design approach sets out a clear lead in applying a Health and Safety mindset.</p> <p>Explains the significance of applying key industry Health and Safety standards including the following, and any subsequent updates or replacements to these;</p> <ul style="list-style-type: none"> - IATF 16949 - AS9001 - ISO18001 - PUWER. B9 	<p>Critically evaluates outcomes from including in the project methodology both Failure Mode Effectiveness Analysis (FMEA) and Advanced Product Quality Processes (APQP). S7</p> <p>Demonstrates in their press tool process how they have used problem solving techniques and root cause analysis to incorporate approaches to reducing downtime for maintenance requirements. B6</p>
<p>Project Management K9 S6 S10 B1 B2</p>	<p>Interprets relevant information and uses effective problem solving techniques to identify key project outcomes and outputs to forecast the cost of volume component production and develop an appropriate project plan to meet time, quality and budgetary requirements. S6 K9</p> <p>Demonstrates monitoring of project costs through reporting against progress throughout the project lifecycle and making plan adjustments where required with articulation of the rationale and the impact on budget management. K9 S6 S10</p> <p>Includes and achieves milestones using APQP (Advanced Product Quality Planning) meetings.</p>	<p>Critically analyses potential contingencies to mitigate the effects of forecast problems and incorporates them into the project plan. K9</p>

	<p>Provides the customer project updates including complex technical information via APQP reports and reporting any possible project time line improvements or delays including the potential consequences of any failures or amendments to the tool process design. K9 S10 B1</p> <p>Conducts a full Component Feasibility Team Review within the project based around the component design. S6</p> <p>Explain key elements of the quoting process within their organisation in relation to the project inception and outcomes. S6</p> <p>Sets the lead in the project with the wider team in demonstrating a professional approach in their work activities and in giving feedback to others. B2</p>	
<p>Analysis S3</p>	<p>Critically analyses, interprets and evaluates approaches used to process complex information and ideas within the creation of the tool process design. S3</p> <p>Utilise computer aided design software to explain the application of analytical approaches to creating the tool process design within the project and the criteria applied for their selection or rejection. S3</p> <p>Undertakes and explains the outcomes from the project feasibility study to deliver tooling solutions by explaining the</p>	

	tolerance calculations and considerations used for each item contributing to the creation of the tool process design. S3	
<p>Quality K4 K7 B7</p>	<p>Demonstrates inclusion and use of appropriate Business Improvement Techniques (BITs) such as business improvement processes and techniques, innovative ways of working, and failure proofing techniques, to deliver a feasible and economically viable process within the project methodology to aid productivity/problem solving. K4</p> <p>.</p> <p>Explains how Advanced lean manufacturing techniques including programme management, failure mode analysis, problem solving, advanced quality planning and single minute exchange of dies (SMED) have been incorporated into the project methodology. K7</p> <p>Explains the logic and procedure for introduction of a new press tool process using Advanced Product Quality Planning (APQP) and Product Part Approval Process (PPAP). B7</p>	<p>Evaluates the benefits and risks to quality of further iterations of the new tooling solution(s) against agreed indicators. B7</p>

Assessment method 2: Professional Discussion underpinned by portfolio

Fail – does not meet the pass criteria

Pass – meets all the pass criteria

Distinction – meets all the pass criteria and all the distinction criteria

KSBs	Pass	Distinction
<p>Tool Design</p> <p>K2, K3, K6,</p> <p>S1, S4,</p> <p>B8</p>	<p>Explains how designs for a new tooling process for volume production is created without inhibiting existing production demand including use of leadership and management techniques to achieve a sustainable outcome. K2</p> <p>Explains how they have adjusted to different conditions and technologies to meet tool process design criteria when designing and trialling volume press tooling processes in a continuous production environment in line with industry requirements and regulations including:</p> <ul style="list-style-type: none"> a. Blanking b. Piercing c. Forming, d. Draw forming e. Press tool components selection f. Ganged setup g. Progression tooling, h. Transfer tooling i. Clamping j. Material selection k. Heat treatment. S1 <p>Explains planning and forecasting outcomes of new tooling processes</p>	

	<p>including those where there is limited definition tooling processes. K3</p> <p>Explains the current and future tool process design market through reference to current research and explaining their potential application within the apprentice's relevant industry sector. B8</p> <p>Evaluates a component drawing and describe the following key points:</p> <ol style="list-style-type: none"> 1) Scientific principles of material selection and its significance 2) Geometric dimensioning 3) Tolerances 4) Mathematical and engineering principles used to assess feasibility to manufacture tool process designs 5) Identification of tool process design problems that may arise during manufacture. K6 <p>Demonstrates design and accurate measurement of a minimum of 2 pre-existing pressed components and compare gap-gauge with laser scanning results. S4</p> <p>Demonstrates use of co-ordinate measuring machine (CMM) dimensional checking to analyse tooling problems and propose a resolution. S4</p> <p>Evaluate the benefits of both measurement methods within tolerances as set down in the specification. S4</p>	<p>Evaluates and proposes improvements to performance and other benefits that arise from developments in the tool process design engineer field and analyses potential outcomes from those proposed improvements. B8</p> <p>Critically analyses significant features shown on the component drawing setting out the manufacturing process to accommodate & maintain quality also reducing process downtime through its production life. K6</p>
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Stakeholder Management K5 S9 B3	<p>Explains how stakeholder management techniques have been used to achieve desired outcomes including the use of appropriate methods of communication. K5 S9</p> <p>Explains the approach taken in the preparation of reports and presentations for different audiences with reasoning given for the use of specific language and phrasing. S9</p> <p>Demonstrates influence over stakeholder decisions through presenting a range of options with risks and benefit analyses. S9</p> <p>Explains how they have worked collaboratively as part of a team with internal and external stakeholders to deliver agreed outcomes. K5 B3</p>	<p>Leads technical discussions with stakeholders, selecting and applying the latest trends, technologies and issues in the sector e.g. assesses emerging technology and the regulatory impact on projects and budgetary constraints. S9</p>
Self-Management B4	<p>Explains how they have actively participated in Continuous Professional Development. B4</p> <p>Describes how they incorporate a self-analytical approach to their practice and have overcome problems through a process of reflection and review with a focus on utilising new technological advances. B4</p>	
Technical K11	<p>Evaluates the significance and uses of different tooling technologies and processes in high volume sheet metal forming and cutting within a</p>	<p>Relates the use of different tooling technologies and processes to improvements</p>

	continuous production environment. K11	in their own engineering activity. K11
Business Awareness K10 S8 B5	<p>Explains how they have committed to their employers' beliefs, goals and standards. B5</p> <p>Explains the wider industry and its professional standards and how they comply with these requirements as part of their role for example ISO manufacturing standards, H&S, Environmental risks. B5</p> <p>Explains leadership techniques applied within their management of their project team, showing a focus on delivery, professionalism, ethics, team formation, dynamics and continuous improvement referencing a set of specific workplace challenges. K10 S8</p>	<p>Evaluates the impact of not following industry practices and the potential consequences and risks to the operations of the business of not following company procedures. B5</p>