

Machining Technician

Level 3 Apprenticeship Standard (ST1305)

Specification



This guide describes the different types of End-Point Assessment tests, the test rules and who should be involved. Preparing for End-Point Assessment and working with SIAS are also covered.

SIAS is the science industry assessment service. It is part of the Cogent Skills Group. For further information about apprenticeship standards and Trailblazers please contact info@siasuk.com.

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Qualification Objective

The aim of this qualification is to ensure that the apprentice is occupationally competent against the knowledge, skills and behaviours outlined in the assessment plan for this standard.

This occupation is found in the Advanced Manufacturing and Engineering (AME) sector, which includes aerospace, automotive, maritime defence, nuclear, and construction sectors. Machining technicians produce complex and precision machined products that are typically used in machinery. For example, aeroplanes and vehicles. They can also produce bespoke components or products for domestic appliances or medical equipment. They use a variety of machines to carry out their work. For example, centre lathes, vertical and horizontal milling machines, horizontal and cylindrical grinding machines. Electro-discharge machines, single and multi-axis computer numeric control (CNC) machine tools centres. Gear cutting and gear grinding machines.

The broad purpose of the occupation is to produce complex and precision work by machining components. Components are machined from metal or specialist materials using conventional or CNC machine tools. Machining Technicians interpret information and plan their activities. They also set up, operate, adjust, or edit machine tool settings. When using CNC equipment, they can produce, prove, or edit programmes. They inspect components and machinery, report issues and support continuous improvement activities. They typically work in a manufacturing environment. Depending on the organisation, they may be required to work at height or work shifts.

In their daily work, an employee in this occupation interacts with other Machining Technicians. They also interact with various stakeholders. They typically report to an engineering or manufacturing team leader. Typically, this would be as part of a defined or cross functional team. They may also interact with customers, suppliers, colleagues, quality auditors and regulators.

An employee in this occupation will be responsible for the quality and accuracy of their work. They also must work efficiently and be productive in the work they undertake. They must work both individually and as part of a larger team. They must work within the relevant health, safety, and environmental regulations. This includes the use of appropriate protective clothing and equipment. They are responsible for the correct use and housekeeping of machinery, tools, and equipment. All work must be completed in a safe and efficient manner as directed by supervisory staff.

Prior Learning and Qualifications

Individual employers will set the recruitment and selection criteria for their Apprenticeships. In order to optimise success, candidates will typically have 4 GCSEs at Grade 4 or Grade C or equivalent, including mathematics, English and a Science.

Overview

A full-time apprentice typically spends 42 months on-programme (this means in training before the gateway) working towards competence as a machining technician. All apprentices must spend at least 12 months on-programme. All apprentices must complete the required amount of off-the-job training specified by the apprenticeship funding rules.

The End-Point Assessment (EPA) is taken in the EPA period. The EPA period starts when SIAS confirms the gateway requirements have been met and is typically 3 months.

Performance in the EPA will determine the overall apprenticeship grades of Distinction, Merit, Pass, or Fail.

Competence Evaluation

During the apprenticeship, regular evaluation of the competence of the apprentice against the apprenticeship standard will help to ensure that they achieve full occupational competence by the end of their training, and they are ready for End-Point Assessment. Confirmation from the employer that the apprentice is fully competent is needed before End-Point Assessment can take place.

As competence evaluation is an in-programme activity, the process that is used for this has not been mandated. It is for the employer supported by their training provider to decide how they wish to do this. To help with this SIAS has produced the SIAS Competence Tracker.

Gateway Requirements

The apprentice's employer must be content that the apprentice is occupationally competent. That is, they are deemed to be working at or above the level set out in the apprenticeship standard and ready to undertake the EPA. The employer may take advice from the apprentice's training provider, but the employer must make the decision. The apprentice will then enter the gateway.

The apprentice must meet the gateway requirements before starting their EPA.

They must:

- confirm they are ready to take the EPA
- have achieved English and maths qualifications in line with the apprenticeship funding rules.
- Have passed:
 - EAL Level 3 Extended Diploma in Machining (Development Knowledge), or
 - Pearson BTEC Level 3 Diploma in Advanced Manufacturing Engineering (Machining) (Development Technical Knowledge), or
 - City and Guilds Machining Technician (1273)
- submit a portfolio of evidence for the interview underpinned by a portfolio of evidence
- for the practical assessment with questions SIAS must discuss with the employer the suitable machine(s) type and components produced by the apprentice in the workplace in the normal course of the role. SIAS will then use this information to select an appropriate assessment task from a bank of tasks that have been developed in

consultation with employers. The apprentice and employer are not to be told the machine type and component to be produced in advance of the assessment

Where geometric tolerances are appropriate to the specific features these will be set by SIAS in accordance with the practical demonstration task.

Assessment Methods

The assessment methods can be delivered in any order.

The result of one assessment method does not need to be known before starting the next.

The EPA consists of 3 discrete assessment methods:

1. Practical Demonstration with Questions
2. Interview underpinned by a Portfolio of Evidence
3. Knowledge Test

Assessment Method 1: Practical Demonstration with Questions

In a practical demonstration with questions, an end-point assessor observes the apprentice completing a task or series of tasks set by SIAS. SIAS decides where it takes place. The assessment environment must closely relate to the apprentice's natural working environment. This allows the apprentice to demonstrate the KSBs mapped to this assessment method.

This EPA assessment method is being used because:

- while this occupation involves practical tasks best assessed through observation on-the-job, the opportunity to demonstrate the transferable skills required may be limited in a real work context due to accessibility and scheduling issues
- a practical demonstration has been selected as this enables all apprentices to have the same opportunity to demonstrate their competence against the KSBs
- questioning allows for the assessment of the breadth and depth of underpinning knowledge against the grading descriptors
- it is a holistic assessment method

The practical demonstration with questions will be structured to give the apprentice the opportunity to demonstrate the KSBs mapped to this assessment method to the highest available grade.

An end-point assessor must conduct and assess the practical demonstration with questions.

The end-point assessor must only observe one apprentice at a time to ensure quality and rigour. They must be as unobtrusive as possible.

SIAS must give an apprentice at least 2 weeks-notice of the practical demonstration with questions.

The practical demonstration with questions must take 4.5 hours.

The end-point assessor can increase the time of the practical demonstration with questions by up to 10%. This time is to allow the apprentice to complete a task or respond to a question if necessary.

The practical demonstration with questions cannot be split, other than for comfort breaks or to allow apprentices to move from one location to another. Where breaks occur, they will not count towards the total EPA time.

SIAS will manage invigilation of the apprentice during the assessment, to maintain security of the EPA, in line with their malpractice policy. This includes breaks and moving between locations during the working day.

The end-point assessor must explain to the apprentice the format and timescales of the practical demonstration with questions before it starts. This does not count towards the assessment time.

The end-point assessor must observe the following during the practical assessment:

- a) preparing work area; using health and safety controls
- b) use of information and documentation, including drawings and risk assessments
- c) selecting appropriate tools and work holding devices; prepare and setup either:
 - conventional machine including tool setting, or
 - CNC (computer numerical control) machine including loading and editing programmes. Editing programmes must include adding substantive features to the existing programme as described in the operations listed below.
- d) performing machining operation; setting and adjusting operating parameters; selecting speeds and feeds; combining a minimum of 3 different operations to produce complex components with a minimum of 3 different features using one type of machine that could include:
 - **Conventional or CNC lathe**
 - screw-cutting internal or external threads
 - bored holes
 - tapered diameters
 - profile forms
 - eccentric features
 - grooves or undercuts
 - **Conventional or CNC milling machine**
 - internal pockets or profiles
 - internal circular or curved profiles
 - external curved profiles
 - holes or features linearly pitched
 - holes or features spaced on a PCD (pitched circle diameter)
 - bored holes
 - treading or tapping
 - keyway or tee shots
 - steps or shoulders
 - open ended shots or enclosed shots and recesses
 - **Conventional or CNC surface or cylindrical grinding machine**

- internal profiles
 - external profiles
 - stepped diameters
 - eccentric diameters
 - flat face
 - stepped faces
 - angled faces
 - profiled faces
 - parallel faces
 - recessed features
- e) using equipment to measure and check the machined component with a minimum of 3 features. The manufactured component with a minimum of 3 features must conform to all quality and accuracy standards applicable to the machine and operations being performed and must be verified by the end-point assessor. Quality and accuracy standards must include applicable tolerances below:
- components to be free from false tool cuts, burrs, and sharp edges
 - general dimension tolerance. Up to plus or minus 0.25mm or plus or minus 0.010 inch
 - one or more specific dimensional tolerances. Specific dimensional tolerances depend on the type of component and feature and must be agreed with SIAS in advance. At least one specific dimension must be fundamental and have a tolerance to plus or minus 0.05mm or 0.002 inch or BS EN ISO 286. SIAS in consultation with the employer will determine the process capability and International Tolerance Grade (IT) as appropriate
 - reamed and bored holes within H8
 - screw threads BS medium fit
 - geometric tolerances where specified to BS EN ISO 1101
 - angles and tapers within plus or minus 0.5 degree
 - in grinding operations, flatness, and squareness within 0.012mm per 25mm or 0.0005 inch per inch
- f) maintaining a safe machine and work area throughout the machining process; checking the condition of tools and equipment identifying and actioning issues

The list above is not exhaustive and SIAS and the employer should discuss suitable machine types. Tolerances will be set by SIAS if the machine is not specified.

These activities provide the apprentice with the opportunity to demonstrate the KSBs mapped to this assessment method.

The end-point assessor must ask questions. The purpose of the end-point assessor's questions will be to support assessment in the following themes:

- work environment
- tools and equipment
- planning
- machine preparation
- manufacture complex components with features

The end-point assessor's questions will also test the apprentice's breadth and depth of underpinning knowledge against the grading descriptors.

Questions must be asked after the practical. The total duration of the practical is 4.5 hours and the time for questioning is included in the overall assessment time. The total time for the practical element is 4 hours. The time allocated for questioning is 30 minutes.

The end-point assessor must ask at least 5 questions. The end-point assessor must use the questions from SIAS' question bank or create their own questions in-line with SIAS' training.

The end-point assessor can ask follow-up questions to clarify answers given by the apprentice. These questions are in addition to the above set number of questions for the practical demonstration with questions.

The end-point assessor will make the grading decision. The end-point assessor will assess the practical assessment and responses to questions holistically when deciding the grade.

The practical demonstration with questions must take place in a simulated environment selected by SIAS for example, SIAS' or the employer's premises. The simulated environment must relate to the apprentice's natural work environment. Equipment and resources needed for the practical demonstration with questions must be provided by SIAS, who can liaise with the employer to provide these.

Questioning that occurs after the practical demonstration with questions should take place in a suitable environment for example a quiet room, free from distractions and influence.

Practical Demonstration Grading Descriptors

KSBs	Pass – Apprentices must achieve all Pass criteria
Work environment S1 S2 S5 S20 B1	<p>P1 Prioritise health and safety and complies with statutory health and safety regulations and procedures throughout the activity. Applies risk assessment principles and hazard identification processes throughout the activity in line with organisational policy and procedure. S1 S5 B1</p> <p>P2 Complies with environmental, ethical and sustainability regulations and procedures, throughout the activity, demonstrating the safe disposal of waste created and the efficient use of resources by reusing and recycling materials where possible. S2</p> <p>P3 Maintains a clean, tidy, and safe working area and returns any unused resources and consumables following organisational procedure. S20</p>
Tools and equipment K10 S17	<p>P4 Selects the tools and equipment required for the activity and checks their condition, identifying and actioning any issues before work commences. K10 S17</p>
Planning K4 K6 S8 S10	<p>P5 Plans and organises the work by reading and interpreting information and documentation and applying planning, time management, workflow, and scheduling techniques. K4 K6 S8 S10</p>

KSBs	Pass – Apprentices must achieve all Pass criteria
Machine Preparation K9 S3 S12 S13 S14	<p>P6 Selects the machining process and prepares and sets up CNC or conventional machines including tooling and work holding devices to manufacture complex components with features. S3 S12 S13</p> <p>P7 Sets up and adjusts machine operating parameters. For example, setting and editing CNC machine programmes, setting feeds and speeds for roughing, and finishing operations in line with manufacturer’s instructions. K9 S14</p>
Manufacture complex components with features K11 K14 S4 S15 S16 S18	<p>P8 Operates and adjusts CNC or conventional machines, applying machining operations and techniques to manufacture complex components with features within given tolerances, identifying and resolving any issues that arise during the manufacturing process. K11 S4 S15 S18</p> <p>P9 Uses measurement, calibration, and testing equipment to check component manufactured meets specification within given tolerances. K14 S16</p>

Fail – An apprentice will fail where they do not demonstrate all the pass descriptors.

Practical Demonstration Knowledge, Skills and Behaviours

Ref	Grading descriptor
Knowledge	
K4	Engineering representations, drawings, graphical information, and specifications.
K6	Planning techniques, time management, workflow, work scheduling, work plans, documents and work categorisation systems.
K9	Tooling and work-holding devices: purpose and operation of devices for carrying out complex machining tasks.
K10	Engineering machining processes tools and equipment: Milling; Turning; Grinding; Electro Discharge Machine (EDM); Gear Cutting.
K11	Machining operations and techniques to produce complex components.
K14	Use and application of measurement, calibration, and testing equipment.
Skills	
S1	Comply with statutory health and safety regulations and procedures.
S2	Comply with environmental, ethical and sustainability regulations and procedures: safe disposal of waste, re-cycling or re-use of materials and efficient use of resources.
S3	Prepare and set up conventional or CNC machines.
S4	Operate and adjust conventional or CNC machines.
S5	Apply risk assessment and hazard identification processes and procedures in the work area.
S8	Read and interpret information. For example, data and documentation used to produce machined components.
S10	Plan and organise own work and resources.
S12	Select machining process.

S13	Select and setup tooling and work holding devices.
S14	Set and adjust machine operating parameters. For example, setting feeds and speeds for roughing and finishing operations, downloading, and editing programmes when using a CNC machine tool.
S15	Apply machining operations and techniques to produce complex components with features. For example, parallel; stepped; angular diameters and faces; grooves; slots; recesses and undercuts; radii and chamfers; internal and external forms and profiles; reamed; bored; drilled and electro eroded holes; internal and external screw threads.
S16	Measure and check components.
S17	Select and check condition of tools and equipment. Identify issues, resolve, and take action as needed.
S18	Identify and action issues in the manufacturing process.
S20	Maintain the work area and return any resources and consumables.
Behaviours	
B1	Prioritise health and safety.

Assessment Method 2 Interview underpinned by a Portfolio of Evidence

In the interview, an end-point assessor asks the apprentice questions. It gives the apprentice the opportunity to demonstrate the KSBs mapped to this assessment method.

The apprentice can refer to and illustrate their answers with evidence from their portfolio of evidence.

This EPA method is being used because:

- it allows for assessment of KSBs that do not occur on a predictable or regular basis
- it is underpinned by a portfolio of evidence, enabling the apprentice to demonstrate the application of skills and behaviours as well as knowledge
- it allows for testing of responses where there are a number of potential answers that couldn't be tested through a multiple-choice test
- it can be conducted remotely, potentially reducing cost

The interview must be structured to give the apprentice the opportunity to demonstrate the KSBs mapped to this assessment method to the highest available grade.

An end-point assessor must conduct and assess the interview.

The purpose of the end-point assessor's questions will be to cover the following themes:

- working in a machining environment
- communications
- quality assurance
- fault finding and taking action
- arranging stock and supplies
- contributing to continuous improvement

SIAS must give an apprentice at least 2 weeks' notice of the interview.

The end-point assessor must have at least 2 week(s) to review the supporting documentation.

The apprentice must have access to their portfolio of evidence during the interview.

The apprentice can refer to and illustrate their answers with evidence from their portfolio of evidence. However, the portfolio of evidence is not directly assessed.

The interview must last for 60 minutes. The end-point assessor can increase the time of the interview by up to 10%. This time is to allow the apprentice to respond to a question if necessary.

The end-point assessor must ask at least 10 questions. The end-point assessor must use the questions from SIAS' question bank or create their own questions in line with SIAS' training. Follow-up questions are allowed where clarification is required.

The interview must take place in a suitable venue selected by SIAS (for example SIAS's or employer's premises).

The interview can be conducted by video conferencing. SIAS must have processes in place to verify the identity of the apprentice and ensure the apprentice is not being aided.

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

Portfolio of evidence requirements:

The apprentice must compile a portfolio of evidence during the on-programme period of the apprenticeship. It should only contain evidence related to the KSBs that will be assessed by this assessment method. It will typically contain 8 discrete pieces of evidence drawn from at least 3 separate job packs or reports. Evidence must be mapped against the KSBs. Evidence may be used to demonstrate more than one KSB; a qualitative as opposed to quantitative approach is suggested.

Evidence sources may include:

- workplace documentation and records, for example:
 - workplace policies and procedures
 - witness statements
 - annotated photographs
 - video clips (maximum total duration 10 minutes); the apprentice must be in view and identifiable

This is not a definitive list; other evidence sources can be included.

The portfolio of evidence should not include reflective accounts or any methods of self-assessment. Any employer contributions should focus on direct observation of performance (for example, witness statements) rather than opinions. The evidence provided should be valid and attributable to the apprentice; the portfolio of evidence should contain a statement from the employer and apprentice confirming this.

SIAS will not assess the portfolio of evidence directly as it underpins the interview. End-point assessors should review the portfolio of evidence to prepare questions for the interview assessment method. They are not required to provide feedback after this review.

Gateway evidence must be submitted to SIAS, along with any organisation specific policies and procedures requested by SIAS.

Interview Grading Descriptors

KSBs	Pass Apprentices must achieve all Pass criteria	Distinction Apprentices must achieve all Pass criteria and all Distinction criteria
Working in a machining environment K18 K22 S22 S24 S25 B2 B4 B6	P10 Explains how they apply ethical principles, and support diversity, equality, and an inclusive culture in the workplace. K22 B2 B6 S24 P11 Describes how they apply team working principles to meet their team's work goals. S25 B4	D1 Justifies their use of procedures in the start-up or warm up, shut down and hand over of machines. S22

KSBs	Pass Apprentices must achieve all Pass criteria	Distinction Apprentices must achieve all Pass criteria and all Distinction criteria
	<p>P12 Describes how they follow organisational procedures in the start-up or warm up, shut down and hand over of machines. Explains how they have escalated issues in the process. S22</p> <p>P13 Explains how machining processes, culture and work values vary between organisations. K18</p>	
<p>Communications K15 K16 S7 S21</p>	<p>P14 Describes how they have used verbal communication techniques and machining terminology which reflects the audience. K15 S21</p> <p>P15 Describes how they record information using paper based and electronic techniques relevant to the machining role. K16 S7</p>	<p>None</p>
<p>Quality Assurance K12 K19 S11 B3</p>	<p>P16 Explains how they take responsibility for their work by following and applying inspection and quality assurance principles, processes, and procedures to ensure products meet specification. States the escalation and recording procedures when issues are found. K12 K19 S11 B3</p>	<p>None</p>
<p>Fault finding and taking action K13 S19</p>	<p>P17 Explains how they have used fault finding and diagnostic methods to diagnose and resolve faults. Describes where they have escalated issues; they are unable to resolve. K13 S19</p>	<p>D2 Justifies diagnostic methods they have used in the identification, resolution and reporting of faults and issues. K13 S19</p>

KSBs	Pass Apprentices must achieve all Pass criteria	Distinction Apprentices must achieve all Pass criteria and all Distinction criteria
Arranging stock and supplies K23 S6	P18 Describes how they monitor, obtain and check stock and supplies, and how they complete stock returns in line with company procedures. Explains stock availability, value, and lead times. K23 S6	D3 Explains how they have or would manage difficulty with sourcing stock or supplies. K23 S6
Contributing to continuous improvement K21 S23 B5	P19 Describes how they have applied continuous improvement techniques and devised suggestions for improvement which add value to the organisation. K21 S23 P20 Describes how they reflect on their own practise and seek CPD opportunities. Explaining how they keep up to date with industry developments. B5	D4 Justifies continuous improvement suggestions which they have devised. K21 S23

Fail – An apprentice will fail where they do not demonstrate all the pass descriptors.

Interview Knowledge, Skills and Behaviours

Ref	Grading descriptor
Knowledge	
K12	Quality assurance: principles, practices and record keeping.
K13	Fault finding, diagnostic methods and techniques for identifying engineering and manufacturing problems. Escalation techniques.
K15	Communication techniques: verbal. Machining industry terminology.
K16	Documentation - electronic and paper.
K18	How organisations vary regarding their work, culture, values, and production processes in the machining industry.
K19	Inspection processes and procedures; documentation and escalation.
K21	Continuous improvement principles and practices: Lean; Six Sigma; Kaizen.
K22	Equality, diversity, and inclusion requirements in the workplace.
K23	Stock and services considerations. Availability, stock lead times. Correct handling. Stock value. Faulty stock and returns process.
Skills	
S6	Monitor, obtain and check stock and supplies, and complete stock returns.
S7	Record information - paper based or electronic. For example, energy usage, job sheets, risk assessments, equipment service records, test results, handover documents and manufacturers' documentation, asset management records, work sheets, checklists, waste environmental records and any legal reporting requirements.

S11	Follow and apply inspection, quality assurance procedures and processes.
S19	Apply fault-finding and diagnostic testing procedures to identify faults. Diagnose and resolve issues. Escalate issues.
S21	Communicate with others verbally. For example, colleagues and stakeholders.
S22	Follow machine shut down, safe isolation, handover, start-up, or warm up procedures. Escalate issues.
S23	Apply continuous improvement techniques. Devise suggestions for improvement.
S24	Apply ethical principles.
S25	Apply team working principles.
Behaviours	
B2	Act ethically.
B3	Take responsibility for work.
B4	Team-focus to meet work goals, for example, work effectively with others, resolves issues in discussion with others.
B5	Committed to continued professional development (CPD) to maintain and enhance competence in their own area of practice.
B6	Support an equality, diverse and inclusive culture.

Assessment Method 3 Knowledge Test

A test is an assessment for asking questions in a controlled and invigilated environment.

This method must be appropriately structured to give the apprentice the opportunity to demonstrate the KSBs mapped to this assessment method to the highest available grade.

The knowledge test can be computer or paper based and will consist of 30 multiple-choice questions, which must be completed within 60 minutes.

The apprentice must be given at least 2 weeks-notice of the date and time of the knowledge test.

The knowledge test is closed book which means that the apprentice cannot refer to reference books or materials whilst taking the test.

The following equipment is allowed to be used during the knowledge test:

- scientific calculator

The knowledge test must be taken in the presence of an invigilator who is the responsibility of SIAS. Specialised (proctor) software can be used if the test can be taken on-line, to ensure the security of the test.

SIAS must verify the identity of the apprentice.

The knowledge test must be marked by independent assessors or markers employed by SIAS. They must follow a marking scheme produced by SIAS. Marking by computer is allowed where question types support this.

- A correct answer gets 1 mark.
- Any incorrect or missing answers get zero marks.

SIAS is responsible for overseeing the marking of the knowledge test. SIAS must ensure standardisation and moderation of written response test.

The apprentices must take the knowledge test in a suitably controlled and invigilated environment that is a quiet room, free from distractions and influence. SIAS must check the venue is suitable.

The knowledge test could take place remotely if the appropriate technology and systems are in place to prevent malpractice. SIAS must verify the apprentice's identity and ensure invigilation of the apprentice for example with, and not limited to, 360-degree cameras and screen sharing facilities.

Knowledge Test Grading Boundaries

Grade	Minimum marks required	Maximum marks required
Fail	0	20
Pass	21	25
Distinction	26	30

Knowledge Test Knowledge, Skills, and Behaviours

Ref	Grading descriptor
Knowledge	
K1	Awareness of health and safety regulations, relevance to the occupation and the Machinist's responsibilities. Health and Safety at Work Act; Control of Substances Hazardous to Health (COSHH); Working in Confined Spaces; Lone Working; Provision of Work Equipment Regulations (PUWER); Electrical Safety and Compliance; Noise Regulation; Slips, Trips and Falls; Display Screen Equipment; Reporting of Injuries, Disease and Dangerous Occurrences Regulations (RIDDOR), Manual Handling, Personal Protective Equipment (PPE), risk assessments and method statements and the implications of not adhering to guidelines and procedures.
K2	Awareness of hazardous waste regulations; recyclable materials and waste disposal procedures and the implications of not complying with regulations and procedures.
K3	Awareness of environment and sustainability regulations, relevance to the occupation and the Machining Technician's responsibilities. Environmental Protection Act; Sustainability; Waste Electrical and Electronic Equipment Directive (WEEE); Energy monitoring; Data logging to optimise energy performance; The Climate Change Agreements; Carbon Reduction Commitment (CRC).
K5	Engineering mathematical and scientific principles: calculations, conversions.
K7	Engineering materials and their structure, properties, and characteristics; impact on use, how and why engineering materials can fail.
K8	Awareness of engineering standards and regulations: British Standards (BS); International Organisation for Standardisation standards (ISO); European Norm (EN); Standard Operating Procedures (SOP).
K17	Housekeeping and maintenance practices and techniques: planned, preventative and predictive methods, frequency, and reactive activities.
K20	Technological development and innovation in the machining sector; Industry 4.0; digitalisation.
Skills	
S9	Apply engineering, mathematical, and scientific principles.

Final Grade

Performance in the EPA determines the apprenticeship grade of:

- fail
- pass
- merit
- distinction

An end-point assessor must individually grade the: practical demonstration with questions and interview underpinned by a portfolio of evidence in line with this EPA plan.

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

If the apprentice fails one or more assessment methods, they will be awarded an overall fail.

To achieve an overall pass, the apprentice must achieve at least a pass in all the assessment methods. To achieve an overall EPA merit, apprentices must achieve a pass in the multiple-choice test, a pass in the practical demonstration with questions and a distinction in the interview underpinned by a portfolio of evidence. To achieve an overall EPA distinction, apprentices must achieve a pass in the practical demonstration with questions, a distinction in the multiple-choice test and a distinction in the interview underpinned by a portfolio of evidence.

Grades from individual assessment methods must be combined in the following way to determine the grade of the EPA overall.

Practical Demonstration with Questions	Interview underpinned by a Portfolio of Evidence	Knowledge Test	Overall Grading
Fail	Any Grade	Any Grade	Fail
Any Grade	Fail	Any Grade	Fail
Any Grade	Any Grade	Fail	Fail
Pass	Pass	Pass	Pass
Pass	Pass	Distinction	Pass
Pass	Distinction	Pass	Merit
Pass	Distinction	Distinction	Distinction

Moderation

Assessment organisations will undertake moderation of End-Point Assessor decisions through observations and examination of documentation on a risk sampling basis. Results cannot be confirmed until moderation has been completed.

Re-sits and re-takes

An apprentice who fails one or more assessment method(s) can take a re-sit or a re-take at their employer's discretion. The apprentice's employer needs to agree that a re-sit or re-take is appropriate. A re-sit does not need further learning, whereas a re-take does.

An apprentice should have a supportive action plan to prepare for a re-sit or a re-take.

The employer and SIAS agree the timescale for a re-sit or re-take. A re-sit is typically taken within 2 months of the EPA outcome notification. The timescale for a re-take is dependent on how much re-training is required and is typically taken within 4 months of the EPA outcome notification.

Failed assessment methods must be re-sat or re-taken within a 6-month period from the EPA outcome notification, otherwise the entire EPA will need to be re-sat or re-taken in full.

Re-sits and re-takes are not offered to an apprentice wishing to move from pass to a higher grade.

An apprentice will get a maximum EPA grade of pass for a re-sit or re-take, unless SIAS determines there are exceptional circumstances.

Certification

The outcomes from the End-Point Assessment will be reviewed and a grade conferred by SIAS in accordance with SIAS QA procedures, which are available from SIAS. SIAS will notify the employer of the outcome of each of the assessments.

SIAS will apply for the apprentice's certificate, which will be sent by ESFA. The certificate confirms that the apprentice has passed the End-Point Assessment, has demonstrated full competency across the standard and is job-ready.

Assessment Specification

The assessment specification can be found in the published assessment plan for the standard. Details of which elements of the apprenticeship standard will be tested by each test are given in the Mapping knowledge, skills, and behaviours section of this guide.

Mapping of knowledge, skills, and behaviours

Key:	
Practical Demonstration with Questions	PD
Interview underpinned by a Portfolio of Evidence	I
Knowledge Test	KT

Ref	KSB to be assessed	Assessment Method
Knowledge		
K1	Awareness of health and safety regulations, relevance to the occupation and the Machinist's responsibilities. Health and Safety at Work Act; Control of Substances Hazardous to Health (COSHH); Working in Confined Spaces; Lone Working; Provision of Work Equipment Regulations (PUWER); Electrical Safety and Compliance; Noise Regulation; Slips Trips and Falls; Display Screen Equipment; The Reporting of Injuries, Disease and Dangerous Occurrences Regulations (RIDDOR), Manual Handling, Personal Protective Equipment (PPE), risk assessments and method statements and the implications of not adhering to guidelines and procedures.	KT
K2	Awareness of hazardous waste regulations; Recyclable materials and waste disposal procedures and the implications of not complying with regulations and procedures.	KT
K3	Awareness of environment and sustainability regulations, relevance to the occupation and the Machining Technician's responsibilities. Environmental Protection Act; Sustainability; Waste Electrical and Electronic Equipment Directive (WEEE); Energy monitoring; Data logging to optimise energy performance; The Climate Change Agreements; Carbon Reduction Commitment (CRC).	KT
K4	Engineering representations, drawings, graphical information, and specifications.	PD
K5	Engineering mathematical and scientific principles: calculations, conversions.	KT
K6	Planning techniques, time management, workflow, work scheduling, work plans, documents, and work categorisation systems.	PD
K7	Engineering materials and their structure, properties, and characteristics; impact on use, how and why engineering materials can fail.	KT
K8	Awareness of engineering standards and regulations: British Standards (BS); International Organisation for Standardisation standards (ISO); European Norm (EN); Standard Operating Procedures (SOP).	KT
K9	Tooling and work-holding devices: purpose and operation of devices for carrying out complex machining tasks.	PD

Ref	KSB to be assessed	Assessment Method
K10	Engineering machining processes tools and equipment: Milling; Turning; Grinding; Electro Discharge Machine (EDM); Gear Cutting.	PD
K11	Machining operations and techniques to produce complex components.	PD
K12	Quality assurance: principles, practices and record keeping.	I
K13	Fault finding, diagnostic methods and techniques for identifying engineering and manufacturing problems. Escalation techniques.	I
K14	Use and application of measurement, calibration, and testing equipment.	PD
K15	Communication techniques: verbal. Machining industry terminology.	I
K16	Documentation - electronic and paper.	I
K17	Housekeeping and maintenance practices and techniques: planned, preventative and predictive methods, frequency, and reactive activities.	KT
K18	How organisations vary regarding their work, culture, values, and production processes in the machining industry.	I
K19	Inspection processes and procedures; documentation and escalation.	I
K20	Technological development and innovation in the machining sector; Industry 4.0; digitalisation.	KT
K21	Continuous improvement principles and practices: Lean; Six Sigma; Kaizen.	I
K22	Equality, diversity, and inclusion requirements in the workplace.	I
K23	Stock and services considerations. Availability, stock lead times. Correct handling. Stock value. Faulty stock and returns process.	I
Skills		
S1	Comply with statutory health and safety regulations and procedures.	PD
S2	Comply with environmental, ethical and sustainability regulations and procedures: safe disposal of waste, re-cycling or re-use of materials and efficient use of resources.	PD
S3	Prepare and set up conventional or CNC machines.	PD
S4	Operate and adjust conventional or CNC machines.	PD
S5	Apply risk assessment and hazard identification processes and procedures in the work area.	PD
S6	Monitor, obtain and check stock and supplies, and complete stock returns.	I

Ref	KSB to be assessed	Assessment Method
S7	Record information - paper based or electronic. For example, energy usage, job sheets, risk assessments, equipment service records, test results, handover documents and manufacturers' documentation, asset management records, work sheets, checklists, waste environmental records and any legal reporting requirements.	I
S8	Read and interpret information. For example, data and documentation used to produce machined components.	PD
S9	Apply engineering, mathematical, and scientific principles.	KT
S10	Plan and organise own work and resources.	PD
S11	Follow and apply inspection, quality assurance procedures and processes.	I
S12	Select machining process.	PD
S13	Select and setup tooling and work holding devices.	PD
S14	Set and adjust machine operating parameters. For example, setting feeds and speeds for roughing and finishing operations, downloading, and editing programmes when using a CNC machine tool.	PD
S15	Apply machining operations and techniques to produce complex components with features. For example, parallel; stepped; angular diameters and faces; grooves; slots; recesses and undercuts; radii and chamfers; internal and external forms and profiles; reamed; bored; drilled and electro eroded holes; internal and external screw threads.	PD
S16	Measure and check components.	PD
S17	Select and check condition of tools and equipment. Identify issues, resolve, and take action as needed.	PD
S18	Identify and action issues in the manufacturing process.	PD
S19	Apply fault-finding and diagnostic testing procedures to identify faults. Diagnose and resolve issues. Escalate issues.	I
S20	Maintain the work area and return any resources and consumables.	PD
S21	Communicate with others verbally. For example, colleagues and stakeholders.	I
S22	Follow machine shut down, safe isolation, handover, start up or warm up procedures. Escalate issues.	I
S23	Apply continuous improvement techniques. Devise suggestions for improvement.	I
S24	Apply ethical principles.	I
S25	Apply team working principles.	I

Ref	KSB to be assessed	Assessment Method
Behaviours		
B1	Prioritise health and safety.	PD
B2	Act ethically.	I
B3	Take responsibility for work.	I
B4	Team-focus to meet work goals, for example, work effectively with others, resolves issues in discussion with others.	I
B5	Committed to continued professional development (CPD) to maintain and enhance competence in their own area of practice.	I
B6	Support an equality, diverse and inclusive culture.	I

Further Information

For information about SIAS policies, quality assurance, re-sits, appeals, complaints and general enquiries please see our website: www.siasuk.com

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