T-LEVELS | Institute for Apprenticeships & Technical Education

T Level Technical Qualification in Engineering, Manufacturing, Process and Control (8713-32)

Machining and Toolmaking Technologies (332)

Practical Assignment

Sample Assessor Pack

First teaching from September 2022
Version 1.0

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1. Assessment

The assessment for this component consists of a practical assignment that includes an assignment brief and then a number of tasks for the candidate to complete. Tasks are assessed by assessment themes that cover a range of knowledge and skills from the performance outcomes. They are designed to allow judgement of the candidate to be made across different categories of performance.

The assessment for this component has been allocated a set number of marks against each assessment theme, based on weightings recommended by stakeholders of the qualification. This mark allocation remains the same for all versions of the assessments, ensuring consistency across assessment versions and over time.

Performance outcomes

The weightings for each performance outcome will remain the same for every version of the practical assignment. This ensures the appropriate depth and breadth of knowledge and skills for each specialism can be reliably assessed in every version and meets the needs of industry while keeping comparability between each assessment over time.

Performance outcome	Typical knowledge and skills	Weighting
PO2 Analyse and interpret engineering and manufacturing requirements, systems, processes, technical drawings and specifications.	Interpret requirements of a brief through the analysis and interrogation of available information sources and formats. Consider all relevant aspects of a brief, challenging and confirming expectations including risks and issues. Select and use techniques, processes and technologies that will assist in the analysis of information available.	17%
PO3 Plan and prepare the relevant processes, tools, equipment, and resources, needed to produce relevant products and produce appropriate outcomes.	Plans to meet the requirements of a brief effectively with consideration of required resources and technology. Identify and mitigate potential issues prior to the manufacturing activity. Check materials conform to specification. Prepare the work area including required tools and equipment for manufacturing products. Measure and mark out components to specification minimising material wastage.	21%
PO4 Produce relevant products and outcomes, considering the specified requirements, context and materials, using the relevant machining and toolmaking technologies, methods and processes.	Accurately shape and manipulate components and products by material removal using appropriate machines, tools and equipment. Effectively operate machinery using appropriate safety measures and guarding. Prepare surfaces and apply suitable treatments to products.	27%
PO5 Support the delivery (and management) of relevant projects and activities, helping to evaluate and review processes and outcomes, and to improve practices.	Monitor production processes, identifying potential risks, issues and problems. Deal with issues and problems quickly and efficiently, using appropriate techniques and processes to address or resolve them, escalate issues in line with correct lines of reporting. Monitor work to ensure efficiency, and carry out checks as part of the production process, safely at all times.	19%
PO6 Communicate production information, proposals and solutions, producing, recording and explaining relevant technical information, representations, processes and outcomes.	Use different techniques to communicate technical information effectively with consideration of audience and format. Produce technical documentation using available tools and technology, accurately recording information, data and risks as part of handover of the process to client/end user.	16%

Grade descriptors

To achieve a pass (threshold competence), a candidate will typically be able to:

Interpret information, plan, assess risk and follow safe working methods when applying practical skills to an acceptable standard in response to the requirements of the brief.

Adequately prepare working areas, acknowledging potential risks and applying acceptable housekeeping techniques during tasks.

Demonstrate basic technical practical skills in machining materials to produce components and products using a range of manual and automated equipment and machinery, which are in line with industry standards and meet the requirements of the brief.

Demonstrate basic knowledge and understanding of the principles and processes required for machining and toolmaking activities.

Work safely showing an understanding in the selection and use of relevant tools and equipment and demonstrate a basic awareness of straightforward preparation and application processes within the working environments for machining and commissioning activities.

Identify causes of problems or common issues related to production control, operating procedures and quality control and have some knowledge and skills in how to rectify them.

Mostly use general industry and technical terminology accurately across different communication methods with some consideration of technical and non-technical audiences.

To achieve a distinction, a candidate will typically be able to:

Competently and thoroughly interpret technical information, applying technical skills to plan, assess risk and follow safe working methods to practical tasks and procedures to an exemplary standard in response to the requirements of the brief, producing an excellent quality of work that meets tolerances, regulations and standards.

Thoroughly prepare working area, mitigating potential risks prior to commencing tasks and consistently apply exemplary housekeeping techniques during tasks.

Demonstrate exemplary technical practical skills in machining materials to produce components and products using a range of manual and automated equipment and machinery activities that are in line with industry standards and meet the requirements of the brief.

Demonstrate exemplary ability to follow procedures to produce or maintain working components.

Work safely and make informed and appropriate use of tools, materials and equipment within the working environments for machining and commissioning activities.

Identify causes and diagnose problems or common issues related to production control, operating procedures and quality control and have a thorough understanding and the skills to be able resolve and rectify them.

Consistently and accurately use industry and technical terminology across different communication methods with full consideration of technical and non-technical audiences.

2. Assignment brief

You are employed within the research and development department of a local engineering company which produces a range of products to the engineering sector.

You have been asked to produce a bearing assembly to be used to in a roller assembly of a bespoke conveyor system.

The bearing assembly is to be manufactured from low carbon mild steel and nylon, produced using the lathe and milling machines you have within your facility.

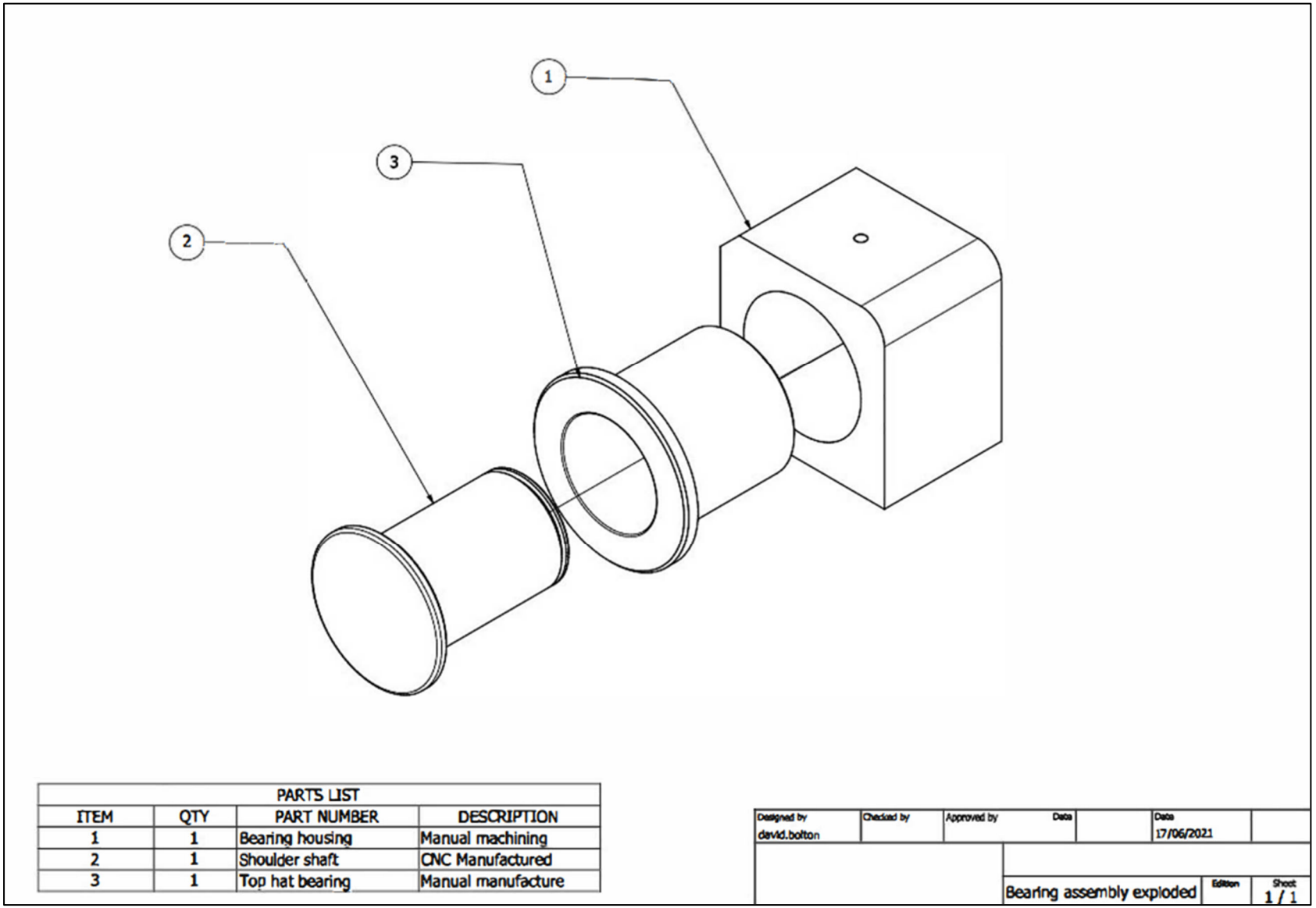
The design office has provided technical drawings.

You are required to:

- create a new bearing assembly
- use manual and pre-programmed CNC machines to manufacture the components
- carry out in-production checks, make adjustments to the components, as required, to ensure the fit conforms to the specification
- quality check the completed bearing assembly
- finish all components with an anti-corrosion product prior to handover
- evaluate the processes and procedures used to produce the finished bearing assembly
- present your completed work and your findings to your supervisor at a handover meeting.

This assignment has a time allocation of **25 hours and 15 minutes.**

Figure 1 – Bearing assembly



PARTS LIST			
ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	Bearing housing	Manual machining
2	1	Shoulder shaft	CNC Manufactured
3	1	Top hat bearing	Manual manufacture

Designed by	Checked by	Approved by	Date	Date
david.bolton				17/06/2021

Bearing assembly exploded | Edition | Sheet 1 / 1

Figure 2 – Bearing housing

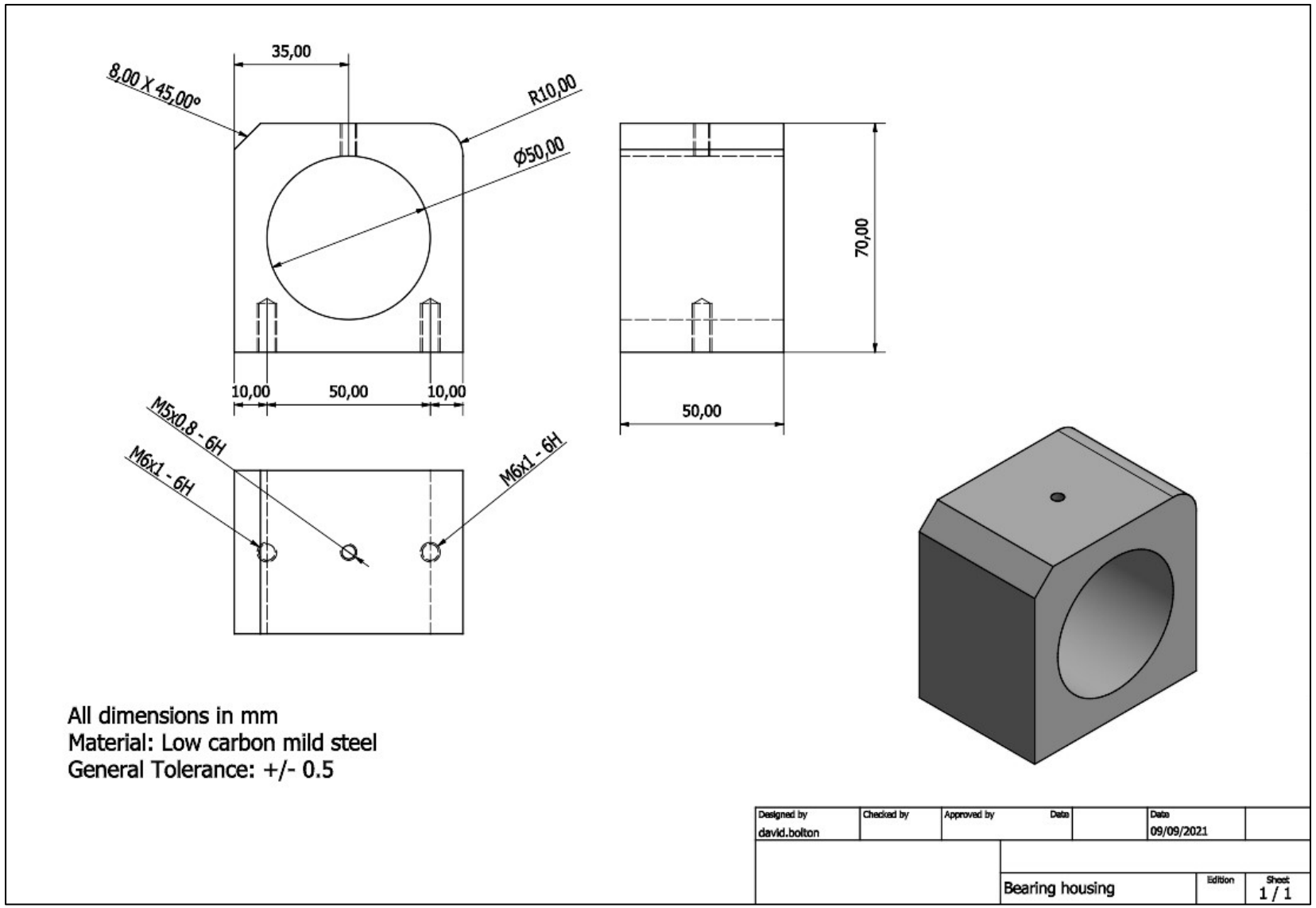


Figure 3 – Top hat bearing

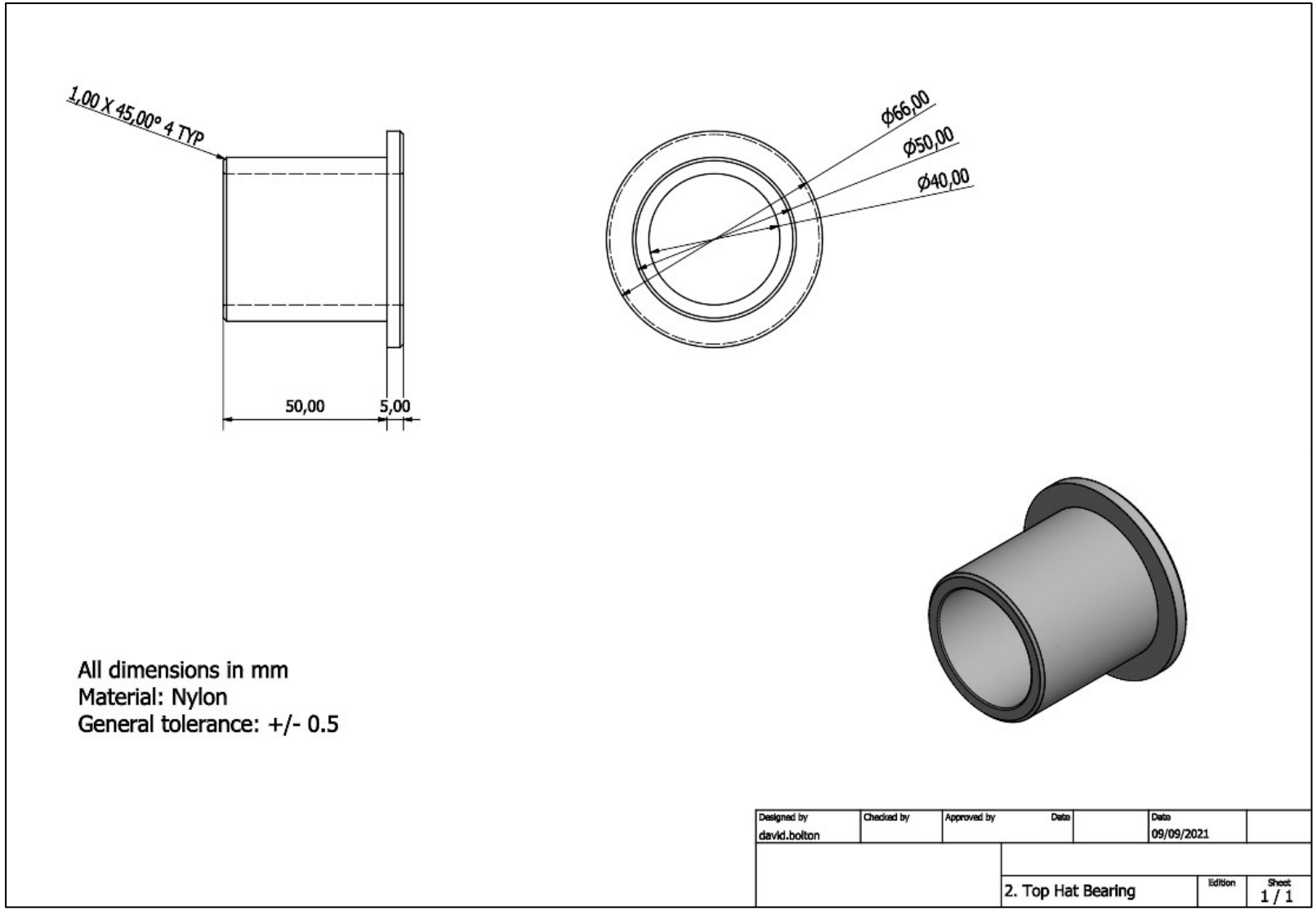
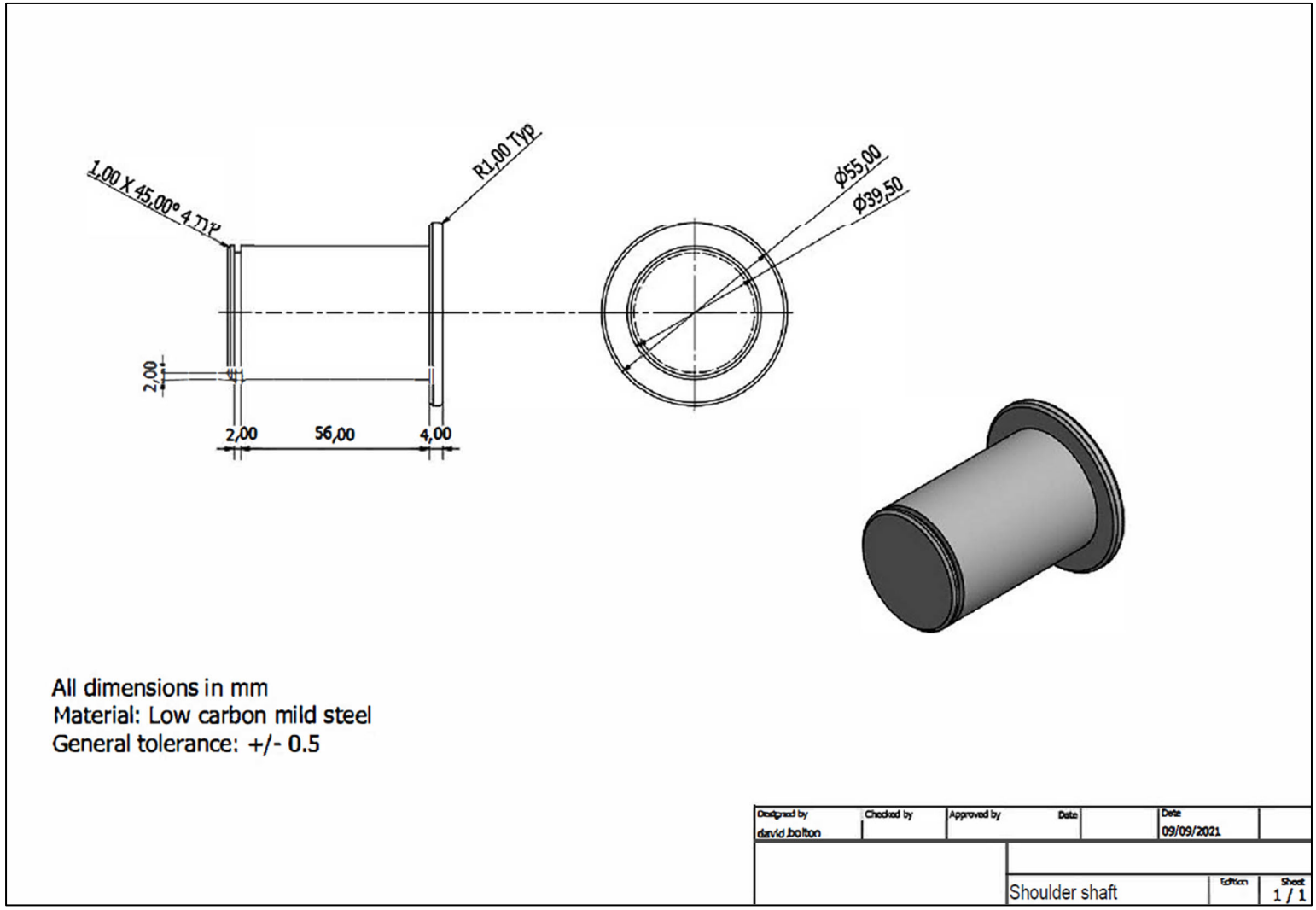


Figure 4 – Shoulder shaft (CNC production)



3. Tasks

General task guidance

Please read **ALL** information carefully before the assessment.

Ensure you have read the following guidance before you undertake the assessment of candidates:

- T level technical qualifications - marking
- T level technical qualifications moderation (updated annually)
- T level qualifications - teaching, learning and assessment
- Technical qualification guides on marking and moderation
- Practical Observation template
- Mark grids following the tasks below
- Feedback guidance for assessors.

All work carried out should be to industry standards, undertaken in a safe manner and compliant with relevant regulations. If a candidate fails to carry out the activities in a safe manner, the assignment should be suspended until this aspect is corrected. Further guidance for assessors can be found in the centre guidance section under health and safety.

Photographs must be used to support the qualitative statements captured on the Practical Observation form. Details of specific photograph requirements are outlined in the task information below. Photographs must have the date and candidate's name attached so that they can be differentiated. The candidate does not need to be in the photograph, the purpose of the photograph is to demonstrate the quality and standards of work of specific activities and of the work throughout various stages of the assignment.

Time

The time allocated for the completion of the tasks and production of evidence for this assessment is **25 hours and 15 minutes**. Timings for completion of specific tasks are outlined below.

- Task 1 – 3 hours
- Task 2 – 18 hours
- Task 3 – 4 hours and 15 minutes.

When working under supervised conditions for longer sessions, breaks can be facilitated outside of the controlled conditions, ensuring the room is locked and all candidates have vacated once the break begins. All materials must be kept securely during the break.

Scheduling assessment sessions

It is the centre's responsibility to arrange how time is managed to fit with timetables and meet the times allocated for each task during the assessment window. Assessment windows are specified in the key date schedule.

The tasks must be issued in order, one at a time to candidates by centres in the scheduled assessment times. Candidates are able to refer to the brief and scenario during all of the scheduled assessment time. Candidates are not permitted to return to tasks after the assessment time for the task has ended and the next task has begun. Candidates must not move on to the next task within the assessment session until instructed to do so by the assessor. It is the assessor's responsibility to ensure that all evidence for a task has been submitted before administering the next task. Candidates are not required to have formal reading time for the scenario and brief, this is included within the duration for Task 1.

When working under supervised conditions for longer sessions, breaks can be facilitated outside of the controlled conditions, ensuring the room is locked and all candidates have vacated once the break begins. All materials must be kept securely during the break.

Centres should aim to schedule tasks in the fewest amount of assessment sessions but ensure that the durations dictated for each task are covered. However, to aid deliverability and manageability of assessment, sessions can be split where there is a requirement. For example, where timetabling of an appropriate location for six hours is not possible, e.g. where centre's access to computer resources is limited, or where candidates are not available for six consecutive hours (e.g. due to work placement commitments). Where this is necessary, sessions should, where possible be timetabled over consecutive days and in as few sessions as possible. All assessment evidence must be stored securely and access to assessment materials and their work only given to candidates during the formal assessment times. All candidates are required to complete a declaration of authenticity along with their evidence submission, and the arrangements must support the assessor in being confident in confirming authenticity.

Where assessments need to be completed in a number of assessment sessions or over consecutive days all practical work areas and any evidence produced must be kept secure and must only be accessed by the assessor. Information and notices should be used to inform other users of the facility that no access will be granted when assessment sessions are in progress. Practical work areas, tools, equipment and systems for the assessment must not be reset until a candidate has completed the full assessment.

Internet access

Where internet access is allowed as part of a task (e.g. for research or report writing purposes) candidates must be advised that this is the case and reminded of the importance of submitting their own work and the seriousness of plagiarism, malpractice and collusion. Candidates should be advised that their browser history can be monitored and checked. Depending on the type of task candidates may be requested to submit their internet search history to be considered as part of the submission of evidence, in order to confirm the authenticity of submitted evidence.

Where candidates are allowed the use of computer equipment, but not the use of the internet for a task, equipment should be provided with internet capability disabled (e.g. Wi-Fi disabled, machine disconnected from network etc.).

Resources

Candidates must have access to a suitable range of resources to carry out the tasks and, where appropriate, to have the opportunity to choose components, tools and equipment that demonstrate their ability to select from a range of appropriate materials.

Where candidates need access to evidence that has been submitted as part of a previous task, this will be provided as a copy of the original evidence and will be given at the start of the relevant task.

The candidate should have access to the following to select and carry out each task:

- writing materials
- access to a computer to produce the report
- non-programmable calculator
- conventional/manual milling machine
- centre lathe
- pre-programmed CNC Lathe (e.g. Boxford educational CNC mill/turn)
- tooling
- holding devices
- materials (low carbon steel/mild steel billets, nylon rod billet)
- measuring equipment (with calibration certificate) (e.g. callipers, go-no-go gauges, DTI clock gauge, rules, tape)
- PPE (eye protection, safety footwear, overalls, gloves, masks/face protection)
- anti-corrosion surface treatment (e.g. degreaser, lubricant, rust protection spray, light tool oil)
- technical drawings
- copies of documents created in Task 1 for reference in subsequent tasks.

The assessment area must also contain the following:

- workshops must be well lit and ventilated
- benches or tables for each candidate
- a clock visible to all candidates
- storage area for part-done and finished pieces
- waste disposal area
- first aid and eye wash station.

Task specific guidance

Each task should be administered separately, and each task should be completed and submitted by all candidates before moving onto the next.

Resources are specified through centre resource list in advance of the assessment but will not be made available to students as this will lead students to know the tools and resources that they must select for themselves in Task 1. Candidates will have access to the workshop/tool cupboard to select resources rather than a list and the required resources are dictated by the guidance and brief.

Task 1

The purpose of this task is for the candidate to plan the work, considering the steps required to produce the assembly in line with the specifications and what safety measures are required to complete the task safely.

Candidates must be provided with the technical drawings to allow them to complete this task.

Candidates must produce a resources list detailing all the resources they will need, including safety equipment. Candidates must also check measuring equipment for calibration and that it is fit for purpose. This must be recorded on their resource list as checked.

Candidates must produce a risk assessment and method statement including a list of the safety equipment required.

Candidates must produce a quality check sheet for use in Task 3A, the check sheet should contain the quality checks to be made, dimensions of the components and additional space for the findings of the inspection to be recorded.

Task 2

The purpose of this task is for the candidate to use appropriate tools and machinery to produce the components for the bearing assembly, to specification.

Work area must be representative of normal centre practice prior to any practical activities taking place for candidates to complete their work area preparation.

Candidates must have access to the workshop/tool cupboard for any additional tools, equipment and components not previously selected in Task 1, which candidates are then able to annotate on their method statement with any changes to their original plans. Assessors must ensure the candidate is working safely and follows a safe system of work during the manufacturing of the components. Candidates are required to produce the shoulder shaft using a pre-programmed CNC milling machine or lathe.

The bearing housing must be machined to size and finished to industry standards. All holes must be tapped, radius and chamfer on milling machine, using appropriate machining vice as work holding device and parallels.

The 50mm diameter hole is produced using a lathe and 4 jaw check set up.

Using DTI clock gauge job concentric to allow hole to be produced using drilling and boring techniques. Deburred and finished accordingly. A surface treatment should be evenly applied to the finished steel components and assembly to prevent future rust and potential seizing of components.

The top hat bearing must be machined to size and finished to industry standards. Candidates must select the bar size, face the bar, turn both diameters and produce internal bore on a lathe. Part off and produce chamfers. Using V-block holding device on milling machine to produce oil hole. The finished assembly must be a hand press fit and within tolerances. Overall tolerance of +/- 0.5 mm on all machined components.

Candidates must follow a safe system of work throughout and comply with the safety practices of the provider. When candidates are using the machines, the assessor is to ensure that safety is fully adhered to. Guards for machinery and PPE must be used throughout.

Inspection should be carried out at relevant points throughout the production process. Particular attention should be dedicated to speeds and feeds adopted. The assessor is to maintain detailed notes throughout to ensure candidate performance is appropriately captured.

Task 3

The purpose of this task is for the candidate to assemble the bearing assembly, inspect the completed assembly for conformity to the specification and identify potential for improvements to the design and/or the production process. This task is in three parts: a, b and c.

3a) Quality review

Work area must be representative of normal centre practice prior to any practical activities taking place for candidates to complete their work area preparation.

Candidates must have access to the workshop/tool cupboard for any additional tools, equipment and components not previously selected in Task 1, which candidates are then able to annotate on their method statement with any changes to their original plans.

Candidates must fully inspect all component parts ensuring that the findings are recorded on the quality check sheet, candidates must also identify and record any components outside of tolerance.

Candidates must utilise measurement equipment to check all components meet the dimensions and profiles as per the technical drawings.

Candidates must record their findings on their Quality Check Sheet, created in Task 1.

Assessors should produce detailed notes throughout the process and take photographs of the stages of production capturing tool selection and tool usage.

3b) Evaluation and recording

Candidates must produce a quality inspection report containing their quality assurance findings and evaluations.

Candidates must collate the evidence of their process and to evaluate the processes they followed and the methods they used and to analyse the effectiveness of their process and to recommend changes or improvements for future production runs.

The inspection report should contain as a minimum the following information:

- finished sizes of components and confirmation the bearing assembly conforms to the dimensional requirements of the specification
- an explanation of the quality checks undertaken and the reasons for their use
- a concessions list for every facet of the assembly that does not conform to the specification, reasons for occurrence and how to prevent reoccurrence
- an evaluation of the fitness for purpose of the finished bearing assembly and method of production used with reasoning and justifications
- any improvements or adaptions required to the bearing assembly, including any reasoning and justifications if adaptions or improvements are not required.

Candidates must compile the report, which can be handwritten or word processed, covering all of the points above. Candidates should make evaluations based on their own performance and justify any improvements, adaptions or instances where no improvements are required/suggested, giving sound justifications and reasoning.

3c) Handover

With the assessor (or another staff member) acting as the Supervisor, candidates must demonstrate a typical handover procedure. Candidates must present their finished work with the inspection report and give the Supervisor a summary of the findings of the report and explain any improvements that they have identified to processes, procedures or product design.

The presentation has been allocated 15 minutes. Assessors will need to schedule candidates time to give their feedback on completion of Task 3b.

This task should take place once Task 3b has ended. No additional preparation time is required as this is a handover exercise and the candidate will have just completed their report and should be able to highlight areas of the report, their findings and their ideas for potential improvements.

The assessor must not ask any questions or prompt the candidate at any point in this meeting. The meeting should be recorded on video for the assessor to refer back to when completing the Practical Observation form and submit as evidence. The video recording should be a maximum of 15 minutes.

Assessors are to record their observations of this presentation on their Practical Observation form.

Task 1 – Planning

Candidates must:

a) analyse the brief and technical information to produce a resources list needed for the production of the bearing assembly
b) produce a risk assessment for the activities needed to produce the bearing assembly to specification
c) produce a method statement with justifications
d) produce a quality check sheet
e) carry out calibration checks on measurement equipment.

Conditions of assessment:

- the time allocated for this activity is **3 hours**
- the candidate must perform the tasks on their own under **controlled conditions** while being observed.

Controlled conditions:

- candidates must only work on their tasks in the allocated times
- assessment evidence must be handed in at the end of each session for secure storage which cannot be accessed by candidates
- all practical work areas and any evidence produced must be kept secure and only be accessible by assessors
- candidates must not share or discuss their work with other candidates
- candidates are not permitted to bring any materials into the assessment session.

What must be produced for marking:

- resources list with measuring equipment calibration check recorded
- risk assessment
- method statement with justifications
- quality check sheet.

Resources:

- technical drawings
- writing materials
- measuring equipment (with calibration certificate) (e.g. callipers, go-no-go gauges, DTI clock gauge, rules, tape)
- non-programmable calculator.

Task 2 – Production

Candidates must:

a) prepare the work area
b) produce the bearing assembly components using both manual and pre-programmed computer numerical control (CNC) machinery to specification
c) apply a suitable surface treatment to the finished components
d) reinstate the work area following the production of the bearing assembly.

Conditions of assessment:

- the time allocated for this task is **18 hours**
- candidates must carry out the task on their own, under **controlled conditions** while being observed
- where assessments need to be completed in a number of assessment sessions or over consecutive days all practical work areas and any evidence produced must be kept secure and must only be accessed by the assessor.

Controlled conditions:

- candidates must only work on their tasks in the allocated times
- assessment evidence must be handed in at the end of each session for secure storage which cannot be accessed by candidates
- all practical work areas and any evidence produced must be kept secure and only be accessible by assessors
- candidates must not share or discuss their work with other candidates
- candidates are not permitted to bring any materials into the assessment session
- assessor observations must be carried out within the assessor to candidate ratio stipulated by City & Guilds.

What must be produced for marking:

- bearing assembly consisting of:
    - bearing housing
    - top hat bearing
    - shoulder shaft.

Additional evidence for this task:

- assessor observation to include:
    - set up and use of manual and pre-programmed CNC workshop machinery
    - the production of the individual bearing assembly components
    - tool skills, application and usage
    - application of hand skills
    - checks carried out before, during and after production
    - work area prior to, during and on completion of tasks.

To support the comments made within the Practical Observation the assessor must capture the following photographs that must be submitted as supporting evidence for each candidate.

Photographic evidence which shows:

- the construction of the bearing assembly, with consideration of
    - the work area prior to, during and on completion of tasks
    - marking out of materials
    - setting up and application of machinery to remove material
    - final finish removal of material and result of tool section for accuracy and the finish of the component parts
    - application of the surface treatment to component parts
- completed bearing assembly.

Resources:

- access to a conventional/manual milling machine
- access to the associated tooling required to produce the components
- access to a manual lathe and CNC centre lathe
- access to the associated tooling/holding devices required to aid with the production of the components
- measuring equipment (with calibration certificate (e.g. callipers, go-no-go gauges, DTI clock gauge, rules, tape)
- anti-corrosion surface treatment (e.g. degreaser, lubricant, rust protection spray, light tool oil)
- appropriate Personal Protective Equipment (PPE) (as per resources list)
- technical drawings
- copies of completed documentation from Task 1.

Materials:

- low carbon mild steel billet with appropriate diameter to the shoulder shaft
- low carbon mild steel billet at correct dimensions to allow machining of bearing housing
- nylon rod billet with appropriate diameter to allow machining of top hat bearing.

Task 3A – Quality review

Candidates must:

a) carry out a full quality inspection of the completed bearing assembly
b) record findings using the quality check sheet.

Conditions of assessment:

- the time allocated for this task is **1 hour**
- candidates must work on their own, under **controlled conditions** while being observed.

Controlled conditions:

- candidates must only work on their tasks in the allocated times
- assessment evidence must be handed in at the end of each session for secure storage which cannot be accessed by candidates
- all practical work areas and any evidence produced must be kept secure and only be accessible by assessors
- candidates must not share or discuss their work with other candidates
- candidates are not permitted to bring any materials into the assessment session
- assessor observations must be carried out within the assessor to candidate ratio stipulated by City & Guilds
- where assessments need to be completed in a number of assessment sessions or over consecutive days all practical work areas and any evidence produced must be kept secure and must only be accessed by the assessor.

What must be produced for marking:

- completed quality check sheet.

Additional evidence for this task:

- completed bearing assembly
- assessor observation to include:
    - use of measuring equipment
    - checks for tolerances and accuracy.

To support the comments made within the Practical Observation the assessor must capture the following photographs that must be submitted as supporting evidence for each candidate.

Photographic evidence which shows:

- the quality review being undertaken, with consideration of
    - checking of tolerances and application and use of appropriate measuring tools and equipment
- bearing assembly components and fully assembled bearing assembly.

Video evidence which shows:

- demonstration showing the fit of the components to form the bearing assembly.

Resources:

- selection of measuring equipment with calibration certificate (e.g. callipers, go-no-go gauges, DTI clock gauge, rules, tape)
- writing materials
- copies of completed documentation from Task 1
- quality check sheet from Task 1
- completed bearing assembly from Task 2.

Task 3B – Evaluation and recording

Candidates must:

a) produce a quality inspection report evaluating the production of their finished bearing assembly. The report should typically be 800 words.
   This must include:
   - finished sizes of components and confirmation the bearing assembly conforms to the dimensional requirements of the specification
   - an explanation of the quality checks undertaken and the reasons for their use
   - an evaluation of the fitness for purpose of the finished bearing assembly and method of production used with reasoning and justifications
   - a concessions list for every facet of the bearing assembly that does not conform to the specification, reasons for occurrence and how to prevent reoccurrence
   - any improvements or adaptions required to the bearing assembly, including any reasoning and justifications if adaptions or improvements are not required.

Conditions of assessment:

- the time allocated for this task is **3 hours**
- candidates must work on their own, under **controlled conditions** while being observed.

Controlled conditions:

- candidates must only work on their tasks in the allocated times
- assessment evidence must be handed in at the end of each session for secure storage which cannot be accessed by candidates
- all practical work areas and any evidence produced must be kept secure and only be accessible by assessors
- candidates must not share or discuss their work with other candidates
- candidates are not permitted to bring any materials into the assessment session
- assessor observations must be carried out within the assessor to candidate ratio stipulated by City & Guilds.

What must be produced for marking:

- quality inspection report.

Additional evidence for this task:

- completed bearing assembly.

Resources:

- writing materials
- access to a computer to write report
- copies of completed documentation from Task 1
- completed bearing assembly.

Task 3C – Handover

Candidates must:

a) hold a meeting with the supervisor to complete handover procedures, including:
    - confirmation of work completed
    - overview of findings in quality inspection report
    - suggested improvements to design or production process
    - handover of completed bearing assembly and quality inspection report.

Conditions of assessment:

- the time allocated for this task is **15 minutes**
  candidates must work on their own, under controlled conditions while being observed
- candidates must carry out the handover meeting, with the assessor (or another staff member) taking the part of the supervisor
- there will be no interaction required or permitted as part of the handover.

Controlled conditions:

- candidates must only work on their tasks in the allocated times
- assessment evidence must be handed in at the end of each session for secure storage which cannot be accessed by candidates
- all practical work areas and any evidence produced must be kept secure and only be accessible by assessors
- candidates must not share or discuss their work with other candidates
- candidates are not permitted to bring any materials into the assessment session
- assessor observations must be carried out within the assessor to candidate ratio stipulated by City & Guilds.

What must be produced for marking:

- assessor observation:
    - handover meeting.

Additional evidence for this task:

- handover materials consisting of:
    - quality inspection report
    - the completed bearing assembly.

To support the comments made within the Practical Observation the assessor must capture the following video that must be submitted as supporting evidence for each candidate.

Video evidence which shows:

- handover meeting.

Resources:

- quality inspection report
- completed bearing assembly from Task 2.

4. Centre guidance

Guidance provided in this document supports the administration of this project.

The following documents, available on the City & Guilds website, provide essential generic guidance for centres delivering Technical qualifications and **must** be referred to alongside this guidance:

- ***T level technical qualifications – marking***
- ***T level technical qualifications – moderation*** (updated annually)
- ***T level technical qualifications – teaching, learning and assessment.***

This assessment is designed to require the candidate to make use of their Core knowledge, understanding and the practical skills they have built up over the course of their learning to tackle tasks/problems/challenges.

This approach to assessment emphasises to candidates the importance and applicability of the full range of their learning to practice in their industry area and supports them in learning to take responsibility for transferring their knowledge, understanding and skills to the practical situation, fostering independence, autonomy and confidence.

Candidates are provided with an assignment brief. They then have to draw on their knowledge and skills and independently select the correct processes, tools, equipment, materials and approaches to take, to complete the brief.

During the learning programme, it is expected that tutors will have taken the opportunity to set shorter, formative tasks that allow candidates to be supported to independently use the learning they have so far covered, drawing this together in a similar way, so they are familiar with the format, conditions and expectations of the assessment.

Candidates should be made aware during learning what the assessment themes are and how they are implemented in marking the assignment, so they will understand the level of performance that will achieve them high marks.

Candidates should not be entered for the assessment until the end of the course of learning for the qualification, so they are in a position to complete the assignment successfully.

Health and safety

Candidates must not be entered for assessment without being clear of the importance of working safely and having attended sufficient practical training to be able to work safely. The assessor must immediately stop an assessment if a candidate works unsafely. At the discretion of the assessor, depending on the severity of the incident, the candidate may be given a warning. If they continue to work unsafely, risking the safety of themselves or others however, their assessment must be ended, and they must retake the assessment in a future series after significant further training has taken place. Any warnings issued to a candidate must be considered as part of the marking process and recorded on the candidate record form (CRF). Any actions that have led to that warning must be detailed on the CRF so they can be considered along with the other evidence when applying the descriptors in the mark scheme.

Compliance with timings

Due to the nature of this assessment, the maximum time allowances provided must be adhered to. They refer directly to assessment time, not any additional setting up times the centre needs to create an appropriate assessment environment.

It is the centre's responsibility to plan sufficient assessment sessions, under the appropriate conditions, within the assignment window, to allow candidates reasonable time to complete the assessment tasks.

Where candidates are required to plan their work, they should have their plans confirmed for appropriateness in relation to the time allocated for each task, to ensure their planning has not left them with too short a time to complete the tasks safely. Any planning that is not appropriate must be recorded on the Candidate Record Form (CRF) as part of the marking process.

Candidates should be allowed sufficient time to fully demonstrate the range of their skills, however this also needs to be reasonable and practicable. Candidates should be allowed to overrun their own planned timings in order for evidence of a range of their skills to be captured. If, however, the time required exceeds the maximum time allowance for the task, the centre must stop the assessment and base the marking on the evidence up to that point.

Any guidance or feedback relating to timings/planning should follow the guidance provided in section *Guidance and feedback* below.

Word counts

Typical word counts, where indicated, are to be used as approximates for guidance to support the production of sufficient evidence. The marking will relate to the quality of the evidence produced and not whether the word count has been met.

Assessor candidate ratios

The number of candidates an assessor will be able to observe at one time will vary depending on local conditions relating to:

- monitoring and maintaining safety during assessment
    - any specific hazards related to the task that pose a risk of harm in relation to the competence of the learners
    - availability of supervisory staff to support the assessor
- the practicalities of collecting evidence
    - the complexity of evidence collection for the task
    - whether there are any peak times where there is a lot of evidence to collect that will need additional support or any that are quieter which may be eased through staggered starts etc
    - local conditions e.g.
        - layout of the assessment environment and sufficient assessor line of sight to task activity throughout the assessment period
        - amount of additional support available (e.g. to capture image/video evidence)
        - availability of suitable workspaces/bays or of shared resources and equipment.

Centres are advised to trial the planned arrangements during formative assessment, reviewing the quality of evidence captured and manageability. It is expected that for straightforward observations, with favourable local conditions and support, (and unless otherwise specified) no more than six candidates will be observed by a single assessor at one time, and the number will usually be fewer than this maximum. The key factors to

consider are the logistics of collecting sufficient evidence and ability to remain working safely in the assessment environment. A timetable of assessments and layout of the workspaces, detailing:

- the students being assessed at each workstation,
- the assessor(s) and
- support staff present

must be available for the moderator on request.

Observation evidence

Observation notes form part of the candidate's evidence and must capture evidence of student performance during the practical tasks describing how well the activity has been carried out, rather than stating the steps/actions, the candidate has taken. The notes must be very descriptive and focus on the quality of the performance that are notable in relation to the quality indicators in the marking grid. They must provide sufficient, appropriate evidence that can be used by the assessor (and moderator) to mark the performance using the marking grid. These descriptions will be used, along with e.g. photographic and video evidence to choose the relevant marking band and mark within the band so that students can be reliably and validly differentiated based on their performance. Evidence captured in the observation form must give the necessary information to enable the final assessment of the task at a later date. This is to allow a holistic judgement to be carried out after all evidence for the task is available, at which point full consideration of how the student has applied both their skills and their knowledge during the practical can be given.

Identifying what it is about the performances that is different between candidates can clarify the qualities that are important to record. Each candidate is likely to carry out the same steps, so a checklist of this information would not help differentiate between them. However, qualitative comments on how well they do it, and quantitative records of accuracy and tolerances would.

The assessor should refer to the marking grid to ensure appropriate aspects of performance are recorded. These notes will be used for marking and moderation purposes and so must be detailed, accurate and differentiating.

Assessors should refer to The ***Technical qualifications guides on marking and moderation*** and The Guide Standard Exemplification Materials to support with the collection of evidence through observation.

Assessors should ensure that any required additional supporting evidence including e.g. photographs or video can be easily matched to the correct candidate, are clear, well-lit and showing the areas of particular interest in sufficient detail and clarity for assessment (i.e. taken at appropriate points in production, showing accuracy of measurements where appropriate).

Assessor marking and justification is completed on a separate form (CRF) to differentiate this evidence from the judgement, since in some cases the observation form will provide evidence relating to the judgement for more than one assessment theme.

As far as possible, candidates must not be distracted, or their performance affected by the process of observation and evidence collection.

The ***Technical qualifications guides on marking and moderation*** are essential guidance documents and are available on the City & Guilds website. These provide further information on preparing for assessment, evidence gathering, standardisation, marking and moderation, and must be referred to when planning and carrying out assessment.

Video and photographic evidence in T Level Technical qualifications

The assessment materials for each assignment identify the minimum candidate and assessor evidence requirements to support marking and moderation. Where ephemeral evidence (e.g. areas of candidate performance that may be hard to capture with photographs and assessor notes alone) plays a significant part of the practical assessment. If this is the case City & Guilds will prescribe the type/capture where the use of video is necessary for practical assessment components (e.g. specifying exactly which elements of the practical must be videoed, or photographed), and any technical specifications for these forms of evidence e.g. length of videos, maximum file sizes etc will also be supplied. Photographic and video evidence will be submitted along with the written candidate evidence and assessor evidence (PO forms) as described in the additional evidence section of the task.

If this is the case then the video evidence must meet these minimum requirements, in order to be considered by moderators:

- as per the guidance in section 2.3.2 of The *Marking and Moderation Guide for Centres*, assessors must ensure that this evidence can be easily matched to the correct candidate and task, is clearly shot, well-lit and shows the areas of particular interest in sufficient detail and clarity for assessment (i.e. filmed at appropriate points in production, showing accuracy of measurements where appropriate)

- the qualitative written evidence provided by assessors must
  - clearly identify the parts of the video that are being referred to, when used as supporting evidence. Using a timecode for this is recommended
  - include their judgement on the performance being demonstrated

- Section 6.5 of the *Centre Manual* also contains general information about the requirements for video evidence submission.

Please note that centres must ensure that video evidence is clear and meets the minimum requirements. The ability of the moderators to take this evidence into account may be impaired and delay the moderation process if the requirements are not met.

Minimum evidence requirements for marking and moderation

The sections in the assignment:

- ***What must be produced for marking***, and
- ***Additional evidence for this task.***

These list the minimum requirements of evidence to be submitted for marking and the moderation sample.

Evidence produced during assessment above and beyond this may be submitted, as long as it provides useful information for marking and moderation and has been produced under appropriate conditions.

While technological methods which support the capturing or creating of evidence can be helpful, e.g. pin board style websites for creating mood boards, the final evidence must be converted to a suitable format for marking and moderation which cannot be lost/ deleted or amended after the end of the assessment period (e.g. screen prints, pdf files). Considerations around tracking authenticity and potential loss of material hosted on such platforms during assessment is the centre's responsibility.

Note: Combining candidates' individual pieces of evidence into single files or zip files may make evidence management during internal marking more efficient and will greatly simplify the uploading of the moderation sample.

Where the minimum requirements have not been submitted for the moderation sample by the final moderation deadline, or the quality of evidence is insufficient to make a judgement, the moderation, and therefore any subsequent adjustment, will be based on the evidence that *has* been submitted. **Where this is insufficient to provide a mark on moderation, a mark of zero must be given.**

Preparation of candidates

Candidates should be aware of which aspects of their performance will give them good marks in assessment. This is best carried out through routinely pointing out good or poor performance during the learning period, and through formative assessment. Although candidates will not have access to the marking grids during the assessment, candidates should be made aware of what they need to do to achieve a pass or distinction by referring and formatively being assessed against grade descriptors as part of their formal learning programme.

During the learning programme, direct tutor instruction in how to approach tasks through modelling, support, guidance and feedback are critical. However, gradual removal of this support is necessary in preparation for summative assessment. This supported approach is not valid for summative assessment.

The purpose of summative assessment is to confirm the standard the candidate has reached as a result of participating in the learning process. Candidates should be encouraged to do the best they can and be made aware of the difference between these summative assessments and any formative assessments they have been subject to. Refer to the ***T Level Technical qualifications – teaching, learning and assessment*** centre guidance document, available on the City & Guilds website for further information on preparing candidates for Technical qualification assessment.

Guidance on assessment conditions

The assessment conditions that are in place for this assignment are to:

- ensure the rigour of the assessment process
- provide fairness for candidates
- give confidence in the outcome.

They can be thought of as the rules that ensure that all candidates who take an assessment are being treated fairly, equally and in a manner that ensures their result reflects their true ability.

The conditions outlined below relate to this assignment. These do not affect any formative assessment work that takes place, although it is advised that candidates are prepared for the conditions they will need to work under during summative assessment.

The evidence for the tasks that make up this assignment must be completed under the specified conditions. This is to ensure authenticity and prevent malpractice as well as to assess and record candidate performance for assessment in the practical tasks. It is the centre's responsibility to ensure that local administration and oversight gives the assessor sufficient confidence to be able to confirm the authenticity of the candidate's work.

Security and authentication of candidate work

Candidate evidence must be kept secure to prevent unsupervised access by the candidate or others. Where evidence is produced over a number of sessions, the assessor must ensure candidates and others cannot access the evidence without supervision. This might include storing written work or artefacts in locked cupboards and collecting memory sticks of evidence produced electronically at the end of each session.

Candidates are required to sign declarations of authenticity, as is the assessor. The relevant form is included in this assignment pack and must be signed after the production of all evidence.

Where the candidate or assessor is unable to or does not confirm authenticity through signing the declaration form, the work will not be accepted at moderation and a mark of zero will be given. If any question of authenticity arises e.g. at moderation, the centre may be contacted for justification of authentication.

Accessibility and fairness

Where a candidate has special requirements, assessors should refer to the ***Access arrangements and reasonable adjustments*** section of the City & Guilds website.

Assessors can support access where necessary by providing clarification to any candidate on the requirements or timings of any aspect of this assignment. Assessors should not provide more guidance than the candidate needs as this may impact on the candidate's grade, see the guidance and feedback section below.

All candidates must be provided with an environment, time frame and resources that allows them reasonable access to the full range of marks available.

Guidance and feedback

To support centre file management, assessors may specify a suitable file format and referencing format for evidence (unless otherwise specified e.g. if file naming is an assessment point for the assignment). Guidance must only support access to the assignment brief and must not provide feedback for improvement. The level and frequency of clarification and guidance must be:

- recorded fully on the Candidate Record Form (CRF)
- taken into account along with the candidate's final evidence during marking
- made available for moderation.

Assessors must not provide feedback on the quality of the performance or how the quality of evidence can be improved. This would be classed as malpractice. However, this does not apply if the assessor asks questions as part of the assessment process. Such requirements will be specifically stated within task centre guidance.

Assessors should however provide general reminders to candidates throughout the assessment period to check their work thoroughly before submitting it, and to be sure that they are happy with their final evidence as it may not be worked on further after submission.

Candidates can rework any evidence that has been produced for each task during the time allowed.

Assessors should check and be aware of the candidates' plans and designs to ensure management of time and resources is appropriate, and so any allowed intervention can take place at an appropriate time.

The information on the guidance given and captured on the CRF is part of the evidence that must be taken into account along with the other evidence for the task when marking. It is up

to the assessor to decide if the guidance the candidate has required suggests they are lacking in any performance outcome and consider the severity of the issue when applying the marking criteria. The assessor must record where and how guidance has had an impact on the marks given, so this is available should queries arise at moderation or appeal.

What is, and is not, an appropriate level of guidance

- The assessor should intervene with caution if a candidate has taken a course of action that will result in them not being able to submit the full range of evidence for assessment. However, this should only take place once the assessor has prompted the candidate to check that they have covered all the requirements. Where the assessor has to be explicit as to what the issue is, this is likely to demonstrate a lack of understanding on the part of the candidate rather than a simple error, and full details should be recorded on the CRF.
- The assessor should not provide guidance if the candidate is thought to be able to correct the issue without it, and a prompt would suffice. In other words, only the minimum support the candidate actually needs should be given, since the more assessor guidance provided, the less of the candidate's own performance is being demonstrated and therefore the larger the impact on the marks awarded.
- The assessor must not provide guidance that the candidate's work is not at the required standard or how to improve their work. In this way, candidates are given the chance to identify and correct any errors on their own, providing valid evidence of knowledge and skills that will be credited during marking.
- The assessor must not produce any templates, pro-formas, work logs etc., unless instructed to in the assignment guidance. Where instructed to do so, these materials must be produced as specified and contain no additional guidance. If templates provided as part of the assignment, these should not be adapted but can be provided to candidates either electronically or as paper based. Compliance of this requirement will be checked at moderation.

All specific prompts and details of the nature of any further guidance must be recorded on the relevant form and reviewed during marking and moderation.

5. Marking guidance

Guidance on marking

Please refer to the ***T Level Technical qualifications – marking*** *and* ***moderation*** centre guidance documents for further information on gathering evidence suitable for marking and moderation, and on using the marking grid and forms.

The Candidate Record Form (CRF) is used to record:

- details of any guidance or the level of prompting the candidate has received during the assessment period
- rough notes bringing together relevant evidence from across tasks during marking
- summary justifications when holistically coming to an overall judgement of the mark for each performance objective and overall
- if an assessment has to be stopped on the grounds of Health and Safety or if a candidate has been working in an unsafe manner.

The Practical Observation form (PO) is used to record:

- descriptive information and evidence of candidate performance during an observation.

Carrying out marking using assessment themes

The process of marking each assessment theme is iterative and should follow the process below which will become more spontaneous over time as the descriptors become familiar. It is recommended to refer back to these frequently however, so the standard does **not** unintentionally drift over the marking period.

The indicative content gives an indication of the expected content parameters the responses are likely to cover, and which aspects of the evidence are relevant. It is not exhaustive, and an acceptable answer may concentrate more on depth rather than fully cover the range indicated or deviate into relevant topics not listed.

The specific task evidence listed within the assessor guide and marking grid must be used to make a judgement on performance in relation the specific assessment theme.

The assessment tasks guide the production of valid evidence under appropriate conditions for assessment. Candidate evidence from a range of tasks may contribute to the marking of a single assessment theme, or from a single task to more than one assessment theme. In this case different aspects of the evidence are being considered for each theme and need to be judged against the marking descriptors specified in the assessment themes independently of each other.

In some cases, the quality indicators looked for in the judgement may naturally be more strongly evidenced in one piece of evidence than another. For instance, more formulaic/prescriptive forms of evidence may not be able to generate evidence of higher levels of performance, so this evidence would need to be looked for in the other forms of evidence. This means that where a range of evidence is to be assessed, it should be treated as a single package of evidence for the purposes of marking even if generated through different tasks.

Timing of marking

As some assessment themes require the triangulation of a number of pieces of evidence, marking cannot take place until after all of these are available. This does not however mean that all marking needs to take place after all candidates have completed the whole assessment.

Also, it is possible to begin recording the notes that will justify the marking for some assessment themes as evidence is produced, with the final mark only being decided once the complete array of evidence is available. This is particularly the case if later evidence is more confirmatory, and the earlier evidence is sufficiently informative for the qualities being assessed to make this a useful exercise.

Through planning, it should be possible to identify any evidence that can start being reviewed earlier, and the assessment themes which could be scheduled for earlier completion of marking e.g. while observation evidence is fresh in the mind should this be helpful. Care must of course be taken to ensure any evidence required by candidates to progress with another task are available for that task to take place. In addition, a sense check must take place across marking for each assessment theme, and across assessors, at the end to ensure marking has not drifted during the period. This may take the form of comparing candidate work to check that the ranking of quality of evidence matches the ranking of marks – where there are discrepancies marking should be checked for accuracy. These checks should be the responsibility of the Internal Quality Assurer and undertaken as part of the centre's Internal Quality Assurance strategy.

Process for each assessment theme:

- Select the range of evidence relevant for making the judgement – this is indicated in the mark scheme for each assessment theme. However, should relevant evidence for any candidate be found elsewhere amongst the rest of their evidence, this may also be taken into consideration when making the marking judgement as long as it is:
    - valid in relation to the assessment theme
    - is produced under appropriate conditions
    - and the marker is confident that it is authentic.
- Scan/read the candidate evidence, any notes on the CRF e.g. regarding level of support/guidance recorded, evidence captured by the assessor and the indicative content and band descriptors in the mark scheme.
- Note: For any warnings given during the assessment the actions that have led to that warning must be detailed on the CRF so they can be considered along with the other evidence when applying the descriptors in the mark scheme.
- Note: the evidence contained on the CRF must be considered and a judgement made on the level of performance the candidate has independently demonstrated – this will vary depending on the level of support detailed on the CRF – i.e. consider all relevant evidence and then judge the appropriate mark following the process below.
- Make an initial assessment of the required evidence as a whole, considering each band in turn and considering the level of performance described in the context of the knowledge and skills in the indicative content to make a balanced judgement of the best band to use as a starting point.
- Read the evidence and review it against the band descriptor in more detail, deciding if the response is securely sitting within the band; i.e. all quality characteristics described by the band descriptor are seen, and strongly meets the level of performance described by the descriptor holistically (i.e. across the range of relevant evidence).
    - check the descriptor for the level above

- if the evidence clearly shows some of the characteristics of the higher band, select a suitable mark at the bottom of that band
- if *not* showing characteristics of the higher band revert to the original band, select a mark at the higher end of that mark range.

If the response is not securely in the band, but *is partially* showing the characteristics of the band,

- check the descriptor of the level below
- decide on a suitable mark either at the bottom of the original band as some characteristics shown, or top of the lower band if it better describes the quality of the characteristics being shown.

If the response is largely meeting the band, with only a few concerns, and is not showing characteristics aligning with the higher or lower bands, the appropriate mark is likely to be in the middle range.

If there is no alignment with the descriptor, reassess the starting band, and begin again.

- Based on the level of alignment with the descriptor, confirm the final mark within the band, bearing in mind that the available marks form an *evenly distributed scale*:
  - if the quality of response *fully* aligns with the performance described by the descriptor – assign a high mark within the band
    If the quality of the response *partially* aligns with the performance described by the descriptor – assign a low to medium mark within the band
  - consider the quality compared to a range of similar responses (e.g. relevant annotated training material exemplars, responses reviewed during standardisation, and through experience) choose a mark on the point on the scale that would give an appropriate ranking for the assessed piece of evidence in relation to this information and in comparison, with that of the rest of the cohort for that assessment theme.

Marking grids

There is a marking grid for each assessment theme that must be assessed as part of this occupational specialism assessment. The individual statements within the band descriptors should be treated together to make one whole descriptor and not separately.

Assessment theme - Health and safety

Guidance for assessors

Evidence from Tasks 1 and 2 should be used to assess performance against this assessment theme.

Task 1

- risk assessment
- method statement with justifications.

Task 2

- assessor observations:
    - set up and use of manual and pre-programmed CNC workshop machinery
    - the production of the individual bearing assembly components
    - tool skills, application and usage
    - checks carried out before, during and after production
    - work area prior to, during and on completion of tasks.

- photographic evidence showing:
    - prepared work area
    - setting up and application of the machinery to remove material
    - completed bearing assembly.

Note: where there is insufficient evidence to award a mark, a zero mark may be given	Band 1 descriptor	Band 2 descriptor	Band 3 descriptor	Total marks per sub assessment theme	Total marks for assessment theme

	Indicative content:
	Completion of a comprehensive assessment of risk and risk management including risks associated with tools and equipment, work area and others safety.
	Risk assessment to include:
	• identification of low, medium and high risks that may include:
	  ○ high risk: inhalation of dust and fumes, mechanical (crushing, shearing, cutting, severing, entanglement), impact hazard, electricity (shock, burns, static)
	  ○ medium risk: health exposure (skin, eye, respiratory irritants), noise, vibration
	  ○ low risk: slip, trip and falls, disposal of waste, work environment
	• analysis of the risk occurring, including who could be affected and the likelihood of them being affected
	• identification of control measures using hierarchy of control, including PPE (eye protection, safety footwear, overalls, gloves, masks/face protection), isolation, guarding, emergency stop/cut off.
	Production of bearing assembly:
	• correct safety checks of all resources including tools and equipment, PPE (eye protection, safety footwear, overalls, gloves, masks/face protection), materials (low carbon steel/mild steel plate, nylon) and consumables (lubricants and coolants)
	• safe isolation procedures, machinery maintenance, replacement or adjustment, completed accurately and safely. (Failure to complete safe isolation as specified and leading to an unsafe situation, will require the assessment to be stopped immediately)
	• work area to be kept tidy throughout the tasks and reinstated after completion of practical activities
	• wearing the correct PPE (eye protection, safety footwear, overalls, gloves, masks/face protection), at all times, as identified in their risk assessment and/or materials list
	• following safe systems of work throughout all practical activities, when working and handling materials (steel, nylon, consumables)
	• health and safety regulations and workplace procedures relating to safe use of tools and equipment, materials, consumables and disposal of waste.				

	Completion of an evaluation and implementation report including: • Health and safety regulations (HASAWA, COSHH, PUWER, Manual Handling, Noise, Electricity, Waste). • workplace procedures relating to safe use of tools and equipment, materials, consumables, maintenance and disposal of waste • measures required for safe isolation prior to maintenance (pre-use checks, changing tooling, removing blockages/build up, clean down) • implications of incorrect construction, assembly and overall performance of the bearing assembly • workplace procedures relating to safe use of tools and equipment, materials, consumables and disposal of waste.				
Marks per band	**1 - 4**	**5 - 8**	**9 - 12**	**n/a**	**12**
	Risk assessment is mostly complete and covers some of the major risk factors. Risk mitigation methods are limited. Likelihood, severity or probability has been taken into account but not for all risks and hazards. Safety issues taken into account as part of preparatory checks and planning activities, including safe isolation some of the time.	Risk assessment is complete and covers all of the major risk factors and a good range of other associated risks. Risk mitigation methods have been identified for some of the potential risks, but not all. Likelihood, severity or probability has been taken into account but for most risks and hazards. Safety issues taken into account as part of preparatory checks and planning activities, including safe isolation most of the time.	Risk assessment identifies all of the major risk factors and all other associated risk factors. Risk mitigation methods are detailed and have been clearly identified for all potential risks. Potential for harm and probability factors have been identified throughout. Safety issues fully taken into account as part of preparatory checks and planning activities, including safe isolation all of the time.		

	Health and safety is followed during preparation and throughout tasks so that work is completed safely but on occasions when working, some potential hazards were missed. Work area is left clear and tidy, tools and equipment returned to stores but not checked, disposal of waste was carried out but with limited reference to disposal requirements and waste regulations.	Health and safety is followed during preparation and throughout tasks and work is completed safely. Most risks and hazards that occur during the tasks are correctly mitigated against as they arise. Work area left safe, clean and tidy, with most tools and equipment checked and returned to correct storage facilities and disposal of waste was carried out taking into account some of the disposal requirements and waste regulations.	Health and safety is followed during preparation and throughout tasks and all work completed safely. All risks and hazards that occur during the tasks are correctly mitigated against as they are arise. Work area is left clear and tidy, all tools and equipment checked, maintained and returned to stores, disposal of waste was carried out taking into account all of the disposal requirements and waste regulations.		

Assessment theme – Planning and preparation

Guidance for assessors

Evidence from Tasks 1, 2 and 3a should be used to assess performance against this assessment theme.

Task 1

- resources list with measuring equipment calibration check recorded
- risk assessment
- method statement with justifications
- quality check sheet.

Task 2

- assessor observations:
    - work area prior to, during and on completion of the tasks
    - set up and use of manual and pre-programmed CNC workshop machinery
    - checks carried out before, during and after production
- photographic evidence showing:
    - prepared work area.

Task 3a

- completed quality check sheet.

Note: where there is insufficient evidence to award a mark, a zero mark must be given	Band 1 descriptor	Band 2 descriptor	Band 3 descriptor	Total marks per sub assessment theme	Total marks per assessment theme
	Indicative content: **Planning:** • analysis and interpretation of technical documentation including the assignment brief, diagrams/drawings, specification, and requirements, using information gathered in the brief provided to plan all activities • an understanding of correctly interpreting safety/data COSHH sheets and manufacturer's information in relation to materials and consumables used throughout the tasks • method statement of how the tasks will be carried out in a safe and logical manner with reasoning to support methods given, identifying a sequence of activities and using correct technical terminology • response to the assignment brief and tasks, and justifications with reasoning • list of appropriate requirements and resources needed to carry out the tasks, with justifications for selection of components and tools, materials and equipment for different aspects of the assignment, wastage and disposal requirements • type, size and quantity of resources needed to complete the tasks in a timely manner • checking of documentation for discrepancies or issues. **Preparation:** • implementation of plans (standard operating procedures, safe systems of work, sequence of activities) • preparation of resources to ensure efficiency in completing tasks: o tools and equipment (measuring tools (engineer's rule, scribes, gauges, callipers), hand tools (files, spanners, screw drivers, wrench, holding devices (chucks, vice, clamps) milling machine, pre-programmed CNC lathe, relevant tooling), consumables (lubricants, coolants) o maintenance (pre-use checks, changing tooling, removing blockages/build up, clean down) and disposal of waste o materials (low carbon steel/mild steel plate, low carbon steel/mild steel billets, nylon rod billet, and consumables (lubricants, coolants, anti-corrosion surface treatment)				

	○ work area (machinery (guarded, maintained, fit for purpose, emergency shut off), lighting, ventilated, cleaning materials, segregated disposal of waste).				
Marks per band	**1 - 4**	**5 - 8**	**9 - 12**	**12**	**21**
Planning	Limited analysis covering some factors relevant to the brief. Basic method statement contains limited information of the scope, processes, tools and equipment. Limited use of relevant technical terminology and some reference to industry standards. Limited list of resources and requirements, including relevant technical documentation, with limited justifications. Planning is basic but does not fully take into account the implications of issues with the production processes, resulting in potential inaccuracies or defects in the finished product.	Analysis covering most factors relevant to the brief in some detail. Logical method statement contains some information of the scope, processes, tools and equipment. Some use of relevant and industry standard technical terminology and good reference to industry standards. List of most resources and requirements, including technical documentation, with some justifications for most, or full justifications for some. Planning is good, processes described, most implications have been taken into account resulting in reduced potential inaccuracies or defects in the finished product.	Thorough analysis covering all factors relevant to the brief. Well-structured method statement contains fully detailed information of the scope, processes, tools and equipment. Relevant and industry standard technical terminology consistently used throughout, very good referencing of industry standards. Comprehensive list of all resources and requirements, including technical documentation, with full justifications for all. Planning is comprehensive, all processes are described in detail, all possible implications have been taken into account, resulting in limited inaccuracies or defects in the finished product.		

Marks per band	1 - 3	4 - 6	7 - 9	9	
Preparation	A limited range of materials, components and resources selected with limited evaluation of preparatory checks taking into account working condition, serviceability or feasibility for the task. A limited range of relevant technical documentation has been prepared but may not have included the quality, accuracy or completeness. Work area prepared safely, sometimes referencing the prepared method statement and workflow. Limited tool calibration checks undertaken.	A good range of materials, components and resources selected with good evaluation of preparatory checks taking into account working condition, serviceability and feasibility for the task. A good range of relevant technical documentation has been prepared for some tasks, with quality, accuracy and completeness taken into account. Work area prepared safely with clear referencing of the prepared method statement and workflow, with safe isolation and calibration checks on most listed tools and equipment.	A comprehensive range of materials, components and resources selected with detailed evaluation of preparatory checks for working condition, serviceability and feasibility. A comprehensive range of technical relevant documentation has been prepared for all tasks, quality, accuracy and completeness are fully taken into account. Work area prepared safely with comprehensive referencing of the prepared method statement and workflow, with safe isolation and calibration checks on all listed tools and equipment.		

Assessment theme – Production

Guidance for assessors

Evidence from Tasks 1 and 2 should be used to assess performance against this assessment theme.

Task 1

- resources list with measuring equipment calibration check recorded
- method statement with justifications.

Task 2

- completed bearing assembly
- assessor observation:
    - set up and use of manual and pre-programmed CNC workshop machinery
    - the production of the individual bearing assembly components
    - tool skills, application and usage
    - application of hand skills
    - checks carried out before, during and after production
    - work area prior to, during and on completion of tasks.
- photographic evidence:
    - the construction of the bearing assembly, with consideration of
        - the work area prior to, during and on completion of tasks
        - marking out of materials
        - setting up and application of machinery to remove material
        - final finish removal of material and result of tool section for accuracy and the finish of the component parts
        - application of the surface treatment to component parts
    - completed bearing assembly.

Note: where there is insufficient evidence to award a mark, a zero mark may be given	Band 1 descriptor	Band 2 descriptor	Band 3 descriptor	Total marks per sub assessment theme	Total marks for assessment theme
	Indicative content: **Measuring and marking out:** • understanding and knowledge of units of measurements (metric and imperial systems), correctly identifying and using measurements (metric and imperial systems), as per the technical drawings • correct selection, setting up and use of measurement equipment (callipers, go-no-go gauges, DTI clock gauge, rules, tape) • technical knowledge and understanding of materials (low carbon steel/mild steel plate, nylon block) and consumables (lubricants, coolants, anti-corrosion) • material selection (low carbon steel/mild steel plate, nylon block) gathering and blanking effectively to minimise waste whilst focusing on quality. **Techniques and methods:** • application of suitable production methods (manual/traditional, computer numerical control (CNC)) and techniques (milling, turning and drilling) with justification for methods and processes used • pre-shaping and marking out effectively completed to enable high quality output • understanding and interpretation of industrial standards, parameters, settings, and tolerances • removing material to shape and manipulate components by milling, turning and drilling • understanding and knowledge of CNC machinery (lathes/milling machines) to manufacture components. **Tools and equipment:** • understanding of correct isolation and waste disposal procedures • tools and machinery selected and utilised effectively in the production of the parts of the bearing assembly • tooling selected, changed and utilised effectively to ensure efficient use of machinery • operating CNC lathe to produce the shoulder shaft				

	• operating manual/traditional workshop lathes, milling machines to produce the bearing housing and top hat bearing • monitoring checks made throughout the activities to ensure parts are manufactured accurately, neatly and to tolerance. **Assembly:** • assembly of components (bearing housing, shoulder shaft and top hat bearing following a logical sequence of assembly • understanding of tolerances and the implications of assembly when components are outside tolerance • application of a surface treatment (anti-corrosion) to finished assembly (e.g. degreaser, lubricant, rust protection spray, light tool oil).				
Marks per band	**1 – 2**	**3 – 4**	**5 - 6**	**6**	**36**
Measuring and marking out	Marking out has been completed, methods used lacks efficiency resulting in some inaccuracies. Basic understanding of measurement terminology and application of correct unit of measurement is accurate some of the time.	Marking out is mostly accurate and method used is correct, resulting in only minor inaccuracies. Good understanding of measurement terminology and application of correct unit of measurement is accurate most of the time.	Marking out is accurate and uses correct method which meets the design specification. Comprehensive understanding of measurement terminology and application of correct unit of measurement is accurate all of the time.		
Marks per band	**1 – 4**	**5 – 8**	**9 - 12**	**12**	
Techniques and methods	Initial cutting, cleaning, deburring and datum edge preparation is completed appropriately, some of the time. A basic understanding of material removal	Initial cutting, cleaning, deburring and datum edge preparation is completed appropriately most of the time. A good understanding of material removal	Initial cutting, cleaning, deburring and datum edge preparation is completed appropriately all of the time. A comprehensive understanding of material		

	techniques, resulting in some components taking longer than expected to finish impacting on the time to complete remaining components to specification and the final assembly. In-production checks carried out to ensure correct dimensions of components prior to assembly, some of the time. A basic understanding of industrial standards to be met.	techniques, components machined efficiency, resulting in minimal impact on time to complete all components to specification. In-production checks carried out to ensure correct dimensions of components prior to assembly, most of the time. A good understanding of industrial standards to be met.	removal techniques and methods ensuring efficient machining and all components completed to specification with time to spare. In-production checks carried out to ensure correct dimensions of components prior to assembly, all of the time. A comprehensive understanding of industrial standards to be met.		
Marks per band	**1 – 4**	**5 – 8**	**9 - 12**	**12**	
Tools and equipment	Sets up the manual machinery to ensure correct parameters and settings have been applied some of the time. Sets up and operates CNC machinery correct parameters and settings are sometimes applied. Machinery is not always handled in a way that promotes its longevity	Sets up the manual machinery to ensure correct parameters and settings have been applied most of the time. Sets up and operates CNC machinery correct parameters and settings are applied most of the time. Machinery is handled in a way that promotes its longevity most of the time,	Sets up the manual machinery ensuring the correct parameters and settings have been applied all of the time. Sets up and operates CNC machinery correct parameters and settings are applied all of the time. Machinery is handled in a way that promotes its longevity all of the time,		

	e.g. pre-use and post-use checks carried out. Returns machinery to a ready state for the next user sometimes. Overall basic application of tool skills resulting in an acceptable quality finish but with noticeable surface defects which detracts from the finished appearance of the assembly.	e.g. pre-use and post-use checks carried out. Returns machinery to a ready state for the next user most of the time. Overall good application of tool skills resulting in a good quality finish but with some minor surface defects but does not attract from the finished appearance of the assembly.	e.g. pre-use and post-use checks carried out. Returns machinery to a ready state for the next user all of the time. Overall comprehensive application of tool skills resulting in a high quality finish with no surface defects and meets the specification of the finished assembly.		
Marks per band	**1 – 2**	**3 – 4**	**5 - 6**	**6**	
Assembly	Assembly/re-assembly process follows a logical sequence of assembly referencing drawings some of the time. Significant adjustments made to the fitting of the assembly required to meet the specification. A surface treatment has been applied to finished assembly, but some areas have been missed or over saturated.	Assembly/re-assembly process follows a logical sequence of assembly referencing drawings most of the time. Minor adjustments made to the fitting of the assembly required to adjust to meet the specification. A surface treatment has been applied to finished assembly, most areas have been treated evenly.	Assembly/re-assembly process follows a logical sequence of assembly referencing drawings all of the time. All components fit together. No adjustments required to the fitting of the assembly, meeting the specification. A surface treatment has been applied to finished assembly, all areas have been treated evenly.		

Assessment theme – Quality review and evaluation

Guidance for assessors

Evidence from Tasks 1, 2, 3a, 3b and 3c should be used to assess performance against this assessment theme.

Task 1

- method statement with justifications
- completed quality check sheet.

Task 2

- completed bearing assembly.
- photographic evidence showing:
    - the completed bearing assembly.

Task 3a

- completed quality check sheet
- assessor observation to include:
    - use of measuring equipment
    - checks for tolerances and accuracy
- photographic evidence showing:
    - the quality review being undertaken, with consideration of
        - checking of tolerances and application and use of appropriate measuring tools and equipment
    - bearing assembly components and fully assembled bearing assembly
- video evidence which shows:
    - demonstration of the fit of the components to form the bearing assembly.

Task 3b

- quality inspection report.

Task 3c

- assessor observation:
  - handover meeting
- video evidence which shows:
  - handover meeting.

Note: where there is insufficient evidence to award a mark, a zero mark may be given	Band 1 descriptor	Band 2 descriptor	Band 3 descriptor	Total marks per sub assessment theme	Total marks for assessment theme
	Indicative content: **Quality review:** **Perform quality inspection on completed assembly:** • use of appropriate measuring equipment (callipers, rule, gauges) • materials used conform to specification • checking of dimensions against a specification • final product conforms to brief, specification, dimensions and design • defect identification, causes and rectification process. **Reporting, recording and handover:** Completion of a quality inspection report to include: • finished sizes of components and confirmation the assembly conforms to the dimensional requirements of the specification • an explanation of the quality checks undertaken and the reasons for their use • an evaluation of the fitness for purpose of the finished assembly and method of production used with reasoning and justifications • problems encountered during the production and assembly, including reasoning and solutions				

	• a concessions list for every facet of the assembly that does not conform to the specification, reasons for occurrence and how to prevent reoccurrence • any improvements or adaptions required to the bearing assembly, including any reasoning and justifications if adaptions or improvements are not required • recording documentation captures key data and conforms the level of quality achieved • documents are collated from all process stages • information and terminology accurate throughout and presented clearly • records of waste disposal and recycling. Handover to include: • use of technical communication and vocabulary during meeting • summary of findings and outcome of activities, problems incurred/resolved • summary of potential improvements to assembly or process for future production.				
Marks per band	**1 – 3**	**4 – 6**	**7 – 9**	**9**	**21**
Quality review	Some dimensions and components are checked for accuracy against the dimensions and tolerances in the specification. Some tolerances met. Some detectable defects are identified and attributed to a process or procedural deficiency. Defect rectification strategy is suggested with the expected outcome suggested some of the time.	Most dimensions and components are checked for accuracy against the dimensions and tolerances in the specification. Most tolerances met. Most defects are identified and attributed to deficiencies in material selection, production or process. Defect rectification strategy is suggested with the expected outcome suggested most of the time.	All dimensions and components are checked for accuracy against the dimensions and tolerances in the specification. All tolerances met. All defects are identified and attributed to deficiencies in material selection, production or process. Defect rectification strategy is suggested with the expected outcome suggested all of the time.		

Marks per band	1 – 4	5 – 8	9 – 12	12	
Reporting, recording and handover	A brief description of the methods and techniques undertaken to produce the assembly, some but not all inconsistencies listed and reasoned but no future prevention methods suggested. Evaluation is basic and identifies a list of improvements with brief justification. Where no improvements/adaptions are needed, this is supported with brief reasoning and justifications to why. Handover meeting is brief, some explanation given to the findings of the report. Basic level of terminology used throughout. Terminology used may have inaccuracies may include inconsistencies and not clear to the targeted audience.	A good description of the methods and techniques undertaken to produce the fabrication, with most inconsistencies listed and reasoned and some future prevention methods suggested. Evaluation is good and identifies a range of improvements with good justification. Where no improvements/adaptions are needed, this is supported with good reasoning and justifications to why. Handover meeting is good, clear explanation given to the findings of the report. Correct industry terminology throughout. Terminology used is mostly accurate with minor errors but does not always take into account the target audience.	A comprehensive description of the methods and techniques undertaken to produce the fabrication, with any inconsistencies listed, well-reasoned and future prevention suggested. Evaluation is thorough and identifies a comprehensive range of improvements with clear and detailed justification. Where no improvements/adaptions are needed, this is supported with detailed and thorough reasoning and justifications to why. Handover meeting is very good, detailed explanation given to the findings. Correct industry terminology used throughout to the targeted audience.		

6. Links to Maths, English and Digital Skills

The table below indicates where each of the General Maths, English and Digital competencies have been integrated into the assignment tasks.

Task	Skills
1	MC2, MC8, MC10, EC1, EC2, EC3, DC1, DC2
2	MC1, MC10, EC1
3	MC1, MC10, EC1, EC2, EC3, EC4, EC6 , DC1, DC2

7. Declaration of authenticity

Assessment ID	Qualification number
Candidate name	**Candidate number**
Centre name	**Centre number**

Additional Support

Has the candidate received any additional support in the production of this work?

No ☐ **Yes** ☐ (Please tick appropriate)

If yes, give details below (and on a separate sheet if necessary).

Candidate:

I confirm that all work submitted is my own, and that I have acknowledged all sources I have used.

Candidate signature	Date

Assessor:

I confirm that all work was conducted under conditions designed to assure the authenticity of the candidate's work, and am satisfied that, to the best of my knowledge, the work produced is solely that of the candidate.

Assessor signature	Date

Note: Where the candidate and/or assessor is unable to or does **not** confirm authenticity through signing this declaration form, the work will be returned to the centre, and this will delay the moderation process. If any question of authenticity arises, the assessor may be contacted for justification of authentication.

8. Candidate Record Form (CRF) - Exemplar

T level technical qualifications

(T level technical qualification – Machining and Toolmaking Technologies Occupational Specialism)

Candidate name	**Candidate number**
Centre name	**Centre number**

Marker Notes *– Please always refer to the relevant marking grid for guidance on allocating marks and make notes which describe the quality of the evidence and justification of marks.*

Please record any guidance, intervention (including Health and Safety) or feedback that is given to a candidate.

Expand boxes as required.

Health and safety												
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Mark	Notes and justification											

Planning and preparation												
Planning												
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Mark	Notes and justification											
Preparation												
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**			
Mark	Notes and justification											

Production						
Measuring and marking out						
	1	**2**	**3**	**4**	**5**	**6**

Mark	Notes and justification

Techniques and methods												
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Mark	Notes and justification											

Assembly						
	1	**2**	**3**	**4**	**5**	**6**
Mark	Notes and justification					

Tools and equipment												
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Mark	Notes and justification											

Quality review and evaluation									
Quality review									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Mark	Notes and justification								

Reporting, recording and handover						
	1	**2**	**3**	**4**	**5**	**12**
Mark	Notes and justification					

Internal assessor signature	**Date**

Total

The T Level is a qualification approved and managed by the Institute for Apprenticeships and Technical Education.