# City & Guilds Level 2 Extended Technical Occupational Entry in Engineering (Diploma) – Production Engineering pathway (2145-12)

Version 1.0 (November 2024)

# Practical Assignment Pack 2145-252

# Candidate Pack (Sample)

| Version and date | Change detail | Section |
|---|---|---|
| V1.0 November 2024 | Initial version | All |
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# Contents

# 1. Assessment overview

This guidance contains assessment documentation for the **Level 2 Extended Technical Occupational Entry in Engineering (Diploma) Production Engineering pathway.**

The assessment for this component consists of an assignment that includes an assignment brief and then a number of tasks for the candidate to complete.

Each task is assessed by a set of grading descriptors which detail achievement required for a Fail level and Pass level.

## 2. Candidate guidance

### General guidance

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

This is a formal assessment that you will be graded on. You will be marked on the quality and accuracy of the work you produce. It is therefore important that you carry out your work out to the highest standard you can.

### Plagiarism

Plagiarism is the failure to acknowledge sources properly and/or the submission of another person's work as if it were your own. Plagiarism is **not** allowed in this assignment.

This assignment is an assessment of your abilities, so the work submitted must be all your own and carried out under the conditions stated. You will be asked to sign a declaration that you have not had any help with the assignment. Your assessor is allowed to give you general advice i.e., clarification of the task instructions. However, general advice will not include:

- Any specific advice on how to improve work to meet the required standard
- Provide feedback on anything missing from your work
- Intervene in any way that improves the standard or presentation of work

If there is a need to provide more than general advice, your assessor will need to record the advice they have given and take it into account when marking the submitted work.

Where research is allowed, your assessor must be able to identify which work you have done yourself, and what you have found from other sources. It is therefore important to make sure you acknowledge sources used and clearly reference any information taken from them (e.g. providing as a minimum a list of web addresses / books / articles etc used).

### Timings and planning

You are advised to study the details of the assessment before starting.

You should check with your assessor that you have all the relevant materials, equipment and information/data sources that you need before starting the assessment.

You should take care when planning to make sure you have divided the time available between parts of the assignment tasks appropriately. Timings for tasks are provided within this pack to support with planning and time allocation.

If you have a good reason for needing more time, you will need to explain the reasons to your assessor and agree a new time for the assessment to take place. Any changes will be at the discretion of the assessor and agreed by City & Guilds.

## 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.

## Health and Safety

You must always work safely, while you are carrying out practical tasks.

You must always follow any relevant Health and Safety regulations, Risk Assessments and codes of practice in line with centre requirements.

If your assessor sees you working in a way that is unsafe for yourself or others, they will highlight the issue and ask you to stop the task immediately.

## Presentation of work

Presentation of work must be neat, legible and appropriate to the task, and evidence required for submission.

You should make sure that each piece of evidence including any forms are clearly labelled with your name and the project reference.

All electronic files must be given a clear file name that allows your assessor to identify it as your work.

Written work may be word-processed or handwritten unless stated otherwise.

All sketches and drawings should be neat, tidy and annotated.

Calculations should be set out clearly, with all working shown, as well as any assumptions made. You should use appropriate units at all times, consistent with the requirements of the assignment.

## Instructions for this assignment

Ensure you read all the provided assessment information issued by the assessor

You must work independently and not share your work with any other candidates in these supervised assessment sessions.

Your work will be kept secure during any supervised breaks that are taken.

Internet access is **not** allowed, unless otherwise stated in the task.

You will not be permitted any additional notes, such as printed resources and textbooks, unless otherwise stated in the conditions for assessment.

You must complete all the tasks and present all evidence that is detailed in each task.

This candidate pack contains the assignment brief.

Any additional documents/templates needed for the task will be provided to you by the assessor.

**Within each task you will find the following:**

- **Resources:** This provides a list of equipment, documents or tools that you will have access to, to complete the task.
- **Conditions of assessment:** This will tell you the duration and rules you must follow when completing a task.
- **Controlled conditions:** This will tell you the rules you must follow when completing each task e.g. You must not share or discuss your work with other candidates.
- **What must be produced for grading:** This describes the evidence you must submit when the task is completed. Be aware failure to submit any evidence requested can adversely affect your overall mark for the assessment.
- **Additional evidence for this task:** This describes other forms of evidence that will be collected by the assessor to support the marking of your performance. This will often include but is not limited to photographic and video evidence.

## 3. Assignment brief

You work for a manufacturing company as a production engineer. You have been asked to produce a prototype of a hand clamp tool. The client has provided some technical sketches containing all the key features and dimensions (Figures 1, 2 and 3).

The clamp comprises six components: a top plate and a bottom plate, which have been pre-prepared, two pieces of screw-bar and two adjustment caps. These are all to be made from mild steel.

You must decide which processes to use to manufacture the components and then carry out the manufacturing operations. The operation must be carried out using manual machining processes. If the prototype is successful, the product will be manufactured in large quantities, and you will need to produce a CAD/CAM file for volume production.

To complete this task, you must:

- Produce a production plan for the prototype clamp with reference to Figures 1, 2 and 3.
- Manufacture and assemble the components based on the production plan, and evaluate the completed prototype against Figures 1, 2 and 3.
- Update the production plan with a CAD/CAM file for volume production.

This assignment has a total duration of **18 hours**.

**Figure 1**

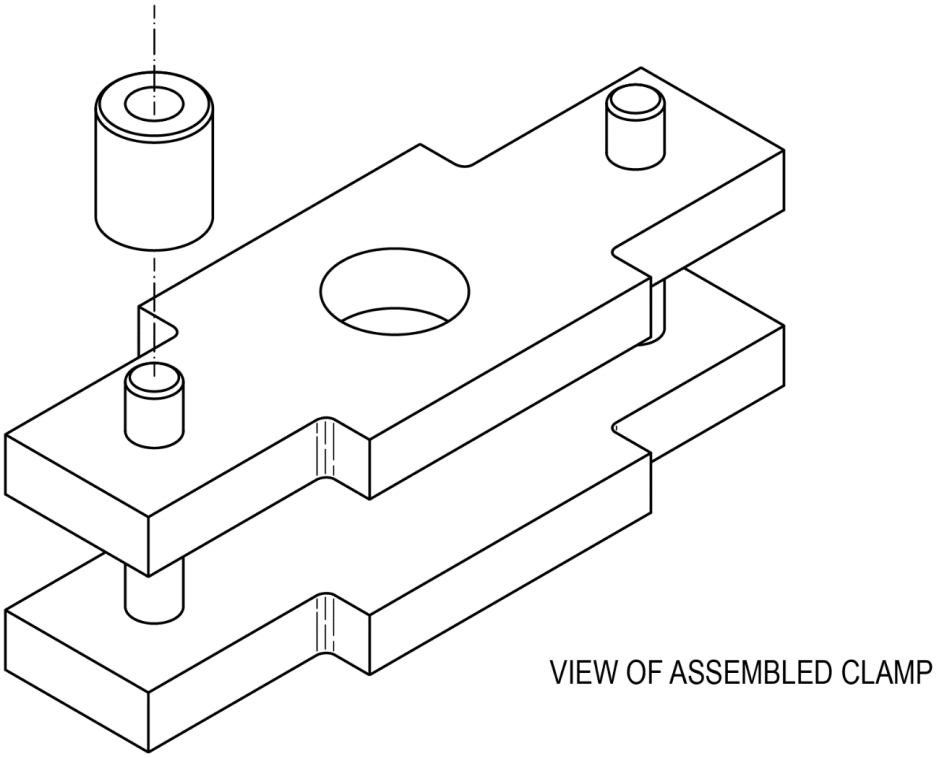


**Figure 2** [1]

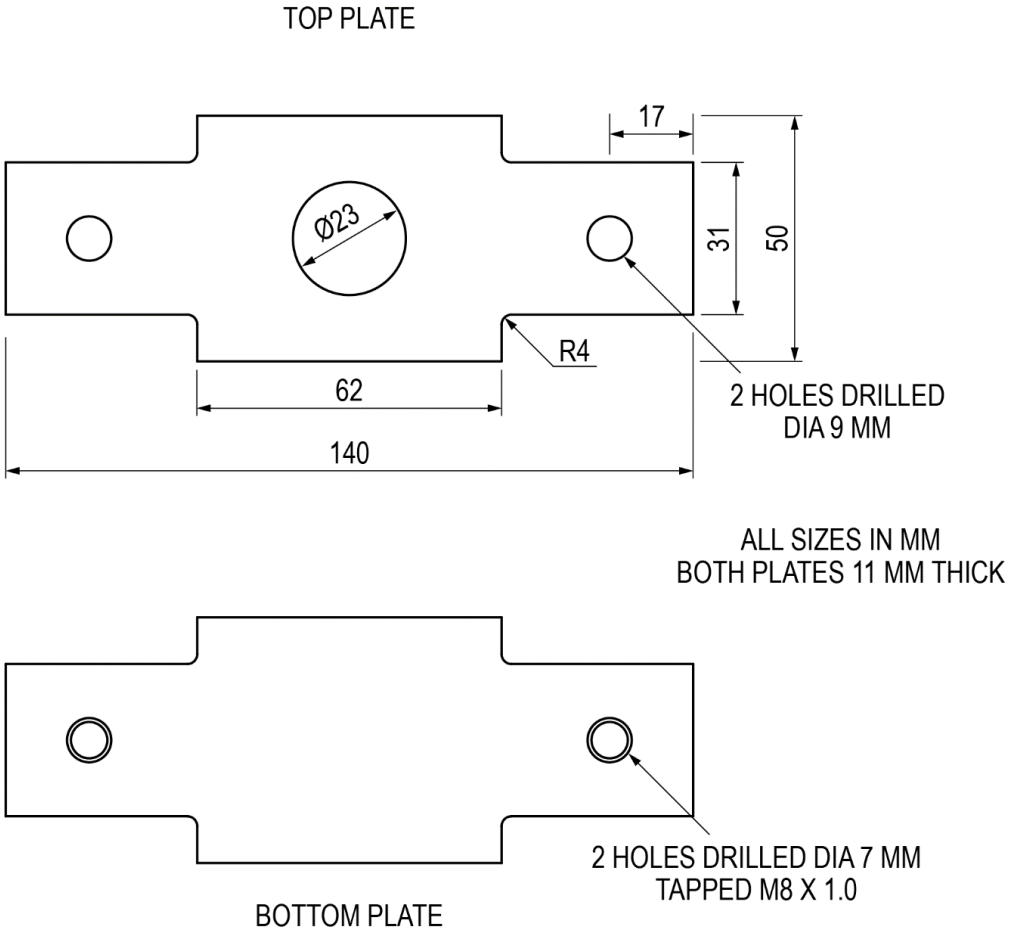
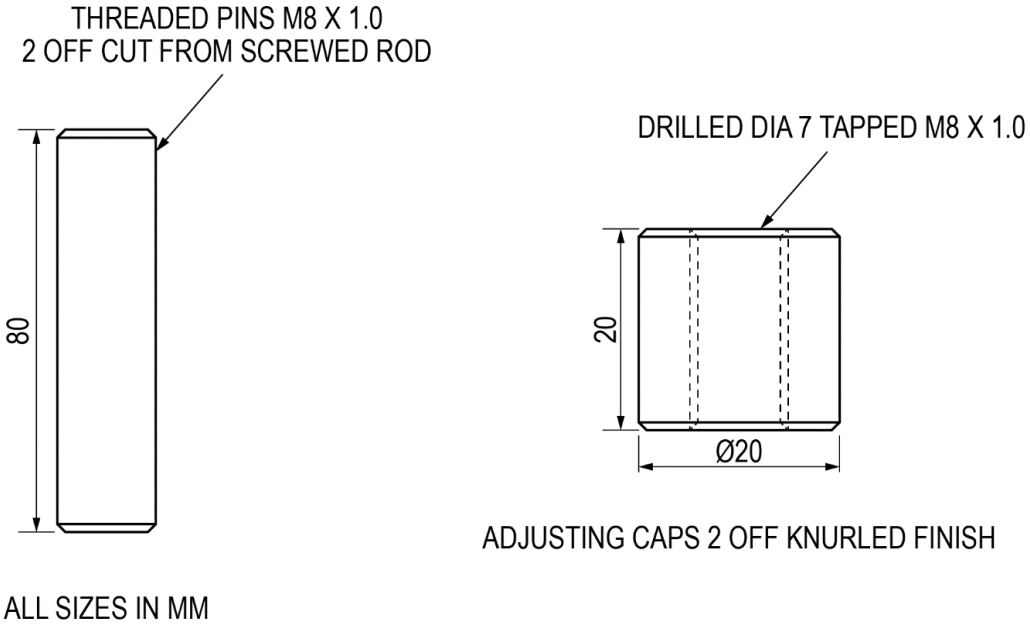



**Figure 3**[2]




[1] Tolerance of 0.2mm
[2] Tolerance of 0.2mm

# 4. Tasks

## Task 1 – Prototype planning

You must:

a) Read the assignment brief and analyse the sketches provided in Figures 1, 2 and 3 in the assignment brief to determine which processes will be used to produce the different components of the hand clamp prototype.

b) Produce a production plan for the prototype using Appendix 1 – Process operation sequence template (provided); this must include:
- project details, eg the hand clamp and materials
- equipment and tools
- planning the activity of component operations in relation to:
    - a top plate
    - a bottom plate
    - two pieces of screw-bar
    - two adjustment caps.

**Conditions of assessment**
- The time allocated for this task is **3 hours.**
- You must carry out the task on your own, under **controlled conditions** while being observed.

**Controlled conditions**
- You must only work on the task in the allocated time.
- Assessment evidence must be handed in at the end of each session for secure storage which cannot be accessed.
- You must not share or discuss your work with other candidates.
- You are not permitted to bring any additional materials into the assessment session.

**What must be produced for grading**
- Production plan for the prototype using Appendix 1 – Process operation sequence template

**Resources**
- Access to relevant information sources (digital or hard copy)
- Appendix 1 – Process operation sequence template
- Appropriate ICT equipment and software

## Task 2 – Manufacture prototype

You must:

Make the prototype, working safely at all times:

- Prepare the work area and refer to the risk assessment provided by the assessor.
- Manufacture the components.
- Assemble the components.
- Evaluate the machined features against the sketches in Figures 1, 2 and 3 and record measurements in Appendix 2 – Assessor quality record check template.
- Restore the work area.

**Conditions of assessment**

- The time allocated for this task is **12 hours.**
- You must carry out the task on your own, under **controlled conditions** while being observed.

**Controlled conditions**

- You must only work on the task in the allocated time.
- Assessment evidence must be handed in at the end of each session for secure storage which cannot be accessed.
- You must be provided with top and bottom templates by the assessor in advance of Task 2.
- You must not share or discuss your work with other candidates.
- You are not permitted to bring any additional materials into the assessment session.

**What must be produced for grading**

- Completed prototype
- A minimum of **four** photographs or videos of the completed prototype components from multiple angles and positions
- Completed quality record check

**Additional evidence for this task**

- Assessor observation of the candidate's working practice describing the quality, consistency and accuracy of the finished work
- Photo or video evidence of the manufacturing activity

**Resources**

- Appendix 2 – Quality record check template
- Non-programmable scientific calculator
- 20mm diameter mild steel bar stock (2 x 25mm minimum length)
- Mild steel flat bar stock for clamp arms, 11mm thickness, 50mm width (2 x 150mm minimum length)
- M8 x 1.0 mild steel screw rod (2 x 100mm minimum length)
- Appropriate personal protective equipment (PPE)

- Access to appropriate reference materials, such as machining datasheets and risk assessments are allowed. All reference material used must be listed within the assignment.

## Task 3 – CAD/CAM file for volume production

You must:

a) Plan and produce a CAD/CAM file for volume production of the adjusting cap.

- Update their production plan from Task 1 for volume production of 1000 adjusting caps to include:
  - advantages and disadvantages of the process and the level of automation in comparison to the prototype, referring to the quality record check from Task 2
  - producing a CAD drawing of adjusting cap(s) for the CAD/CAM file.

- You need to produce a 2D CAD/CAM file that must include:
  - the CNC code for the adjusting cap.

**Conditions of assessment**

- The time allocated for this task is **3 hours.**
- You must carry out the task on your own, under **controlled conditions** while being observed.

**Controlled conditions**

- You must only work on the task in the allocated time.
- Assessment evidence must be handed in at the end of each session for secure storage which cannot be accessed.
- You must not share or discuss your work with other candidates.
- You are permitted to have access to your Task 1 production plan (process operation sequence) and quality record check from Task 2 (for reference only), but are not permitted to bring any other materials into the assessment session.

**What must be produced for grading**

- Updated production plan (process operation sequence) for volume production of adjustment cap in the form of a new document
- CAD/CAM file

**Resources**

- Access to relevant information sources (digital or hard copy)
- Appropriate ICT equipment and software
- CAD/CAM software
- Internet access, if required for CAD/CAM software

# Appendix 1 – Process operation sequence template (Task 1)

| Task | Qualification number |
|---|---|
| Task 1 – Prototype planning | 2145-12 |
| **Candidate name** | **Candidate number** |
| | |
| **Centre name** | **Centre number** |
| | |

| Project details | Adjustable clamp prototype |
|---|---|
| Material: | |
| Dimensional tolerances: | |
| Surface finish requirements: | |

| Equipment and tools | |
|---|---|
| Machine type | |
| Cutting tools | |
| Work-holding device | |
| Coolant system | |

**Planning the production activity:**

| Op no. | Component | Feature name/appearance | Tools and equipment |
|---|---|---|---|
| | | | |
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| Op no. | Component | Feature name/appearance | Tools and equipment |
|---|---|---|---|
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| Problem solving |
|---|
| [If any issues or flaws occur during the process, describe how you address and resolve them.] |

| Assessor signature | Date |
|---|---|
| | |

# Appendix 2 – Quality record check template (Task 2)

| **Task** | **Qualification number** |
|---|---|
| Task 2 – Manufacture prototype | 2145-12 |
| **Candidate name** | **Candidate number** |
| | |
| **Centre name** | **Centre number** |
| | |

| **Quality check against adjustable clamp** | | | |
|---|---|---|---|
| **Dimensional check: top plate** | **Required** | **Record actual** | **Pass/Fail** |
| Diameter (mm) | | | |
| Diameter (mm) | | | |
| Length (mm) x Width (mm) | | | |
| Length (mm) x Width (mm) | | | |
| Radius (mm) x 4 | | | |

| **Dimensional check: bottom plate** | **Required** | **Record actual** | **Pass/Fail** *(within or not within tolerance)* |
|---|---|---|---|
| Diameter (mm) | | | |
| Diameter (mm) | | | |
| Length (mm) x Width (mm) | | | |
| Length (mm) x Width (mm) | | | |
| Radius (mm) x 4 | | | |
| Internal thread (mm) x 2 | | | |

| Dimensional check: threaded pins (2) | Required | Record actual | Pass/Fail |
|---|---|---|---|
| Diameter (mm) | | | |
| Diameter (mm) | | | |
| Length (mm) | | | |
| Length (mm) | | | |

| Dimensional check: adjusting caps (2) | Required | Record actual | Pass/Fail |
|---|---|---|---|
| Diameter (mm) | | | |
| Diameter (mm) | | | |
| Length (mm) | | | |
| Length (mm) | | | |
| Knurled | | | |

| Visual inspection | Required | Observations describe | Pass/Fail |
|---|---|---|---|
| Scratches or defects | | | |
| Burrs | | | |
| Surface irregularities (false tool cuts) | | | |

| Assembly of parts | Comments: Pass/Fail |
|---|---|
| Perpendicular aligned | |
| Functional | |

| Candidate signature | Date |
|---|---|
| | |
| **Assessor signature** | **Date** |
| | |