T Level Technical Qualification in Design and Development for Engineering and Manufacturing (Level 3)

Structural Engineering Occupational Specialism (8714-34)

Practical Assignment

Candidate Pack (Sample)

September 2025 Version 2.0

Contents

Version and date	Change detail	Section
V1.0 June 2023	Approved version	n/a
V2.0 September 2025	Refinement of layout and formatting Removal of any duplicated information Candidate guidance, Brief and Tasks amalgamated into one document	All

1. Assessment

This assessment is for the Structural Engineering Occupational Specialism component of the Technical Qualification. This pack consists of a practical assignment brief, including drawings and diagrams as necessary, that you will need to use to complete your assessment tasks.

2. Candidate guidance

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

Health and safety
You must always work safely, in particular 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.

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, such as, clarification of the task instructions. However, general advice will not include:

- any specific advice on how to improve work to meet the required standard
- feedback on anything missing from your work
- any intervention 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 parts of the work you have done yourself, and what you have found from other sources. It is therefore important to make sure you acknowledge the sources you used and clearly reference any information taken from them (e.g. providing as a minimum a list of web addresses, books, articles etc that you used).

Use of Artificial Intelligence (AI)
AI may only be used as a source where the use of the internet is allowed for a research task. Where you use AI, you must acknowledge its use and show clearly how you have used it. Please be aware that how you have decided to use it may impact on the overall mark you are allocated.

Guidance and feedback
There are some rules around how much guidance and feedback your assessor can provide as part of completing the assignment. Your assessor is allowed to give you some help in understanding the task instructions if necessary. However, if significant clarification and guidance is provided by your assessor this will be recorded and considered as part of the marking process and may reduce your mark. Your assessor will make it clear if any guidance given may reduce your mark before it is given, so that you understand this when asking for guidance.

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 appropriately divided the time available between parts of the assignment tasks. 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 to 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.

Submission of evidence
Your work will be submitted as final at the end of each assessment session. You will not have an opportunity to rework any of your evidence once the assessment session ends. However, if through other tasks within the project, you develop your ideas or build on earlier tasks, then you should continue to build on these and should use your evaluation to outline the reasons why this happened.

Presentation of work
The presentation of your 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 task 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 digital or handwritten unless stated otherwise.

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

Calculations should be set out clearly, showing all working and any assumptions you 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 assessment booklet contains the assignment brief.

The tasks have been separated into individual documents which will be handed to you at the start of each task.

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

Within each task you will find the following:

- **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. For example, you must not share or discuss your work with other candidates.
- **What must be produced for marking:** This describes the evidence you must submit when the task is completed. Be aware that 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.
- **Resources:** Provides a list of equipment, documents or tools that you will have access to, to complete the task/sub task.

3. Assignment brief

The electricity pylons that grace the UK skyline have their origins in a design submitted to the then Central Electricity Board by the Milliken Brothers in 1928 (refer to Figure 1 below).

Figure 1: The Milliken Brother's Icon Pylon (source https://www.gorge.org/pylons/structure.shtml)

The design of the electric pylon has reflected this iconic, four-sided trussed structure for over 90 years. Many of these pylons are coming to the end of their useful design lives, despite regular maintenance schedules. As a consequence, a new progressive electrical company wants to introduce a more modern pylon which is less obvious on the skyline and will have less of a visual impact. They have launched a design competition for the new pylon.

You are working as a structural engineer at an engineering company. Your company has entered the competition and you have been asked to design a pylon to be entered into the competition.

Design Criteria

The design criteria for this application are:

- the pylon must have two 8m cross arms to support electric power lines
- the pylon must have an overall height of 36m
- the pylon must support an imposed load of 600kN for electrical catenary and wires at the end of each cross arm
- the pylon must be less visually intrusive on the skyline
- the pylon must be resilient in all weather conditions
- the pylon must be aesthetically acceptable in both urban and natural environments
- the pylon must have limited operational maintenance
- the pylon must have reduced vulnerability to lightning strike
- the pylon must be sustainable and easily repurposed at the end of life
- the pylon must be easily installed by a mobile crane.

This assignment has a time allocation of **34 hours**.

4. Tasks

Task 1 - Design

You must:

a) produce a detailed design specification that builds on the design criteria for the full-size pylon, including any references to research used
b) sketch and annotate up to three potential designs for the pylon
c) select one appropriate design for development with justifications
d) select and justify the use of the materials and components needed for the proposed design
e) carry out design calculations justifying the initial member size of the body and cross arms of the pylon
f) create engineering drawings of the proposed design using CAD software
g) produce a virtual model of the proposed design using CAD software to illustrate the form of the pylon, construction sequence and the suitability of its setting in a rural and urban landscape
h) create a bill of materials (BoM) listing all of the parts required in your final design proposal.

Conditions of assessment:

- the time allocated for this task is **14 hours**
- you must carry out the task on your own, under **controlled conditions.**

Controlled conditions:

- you must only work on the tasks in the allocated times
- 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 materials into the assessment session.

What must be produced for marking:

- design specification
- up to three annotated sketches
- justification of the choice of one design for further development
- justification of the selection of the materials and components
- design calculations, including all workings
- engineering drawings of the proposed design
- outcomes of the virtual modelling of the proposed design, either as screen captures or printouts
- bill of materials

Additional evidence

- any notes produced of research undertaken including citation of sources and internet search history must be submitted to ensure the authenticity of evidence produced.

Resources:

- access to the internet for research
- pencil and paper for hand sketches
- scientific calculator
- CAD software
- tables of material densities
- tables of structural section sizes for different materials.

Task 2 – Manufacture and test

You must:

a) produce a risk assessment for the manufacture of the scaled prototype
b) construct a scaled prototype to be used in testing of the main body of the pylon
c) carry out testing for the scaled prototype pylon checking its suitability of carrying the required scaled loading, recording your findings
d) select and carry out material strength testing for a fully-scaled sample piece of the body of the main pylon provided by your assessor, recording your findings.

Conditions of assessment:

- the time allocated for this task is **13 hours**
- you must carry out the task on your own, under **controlled conditions**.

Controlled conditions:

- you must only work on the tasks in the allocated times
- 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 materials into the assessment session.

What must be produced for marking:

- risk assessment
- test records
- scaled prototype.

Additional evidence for this task:

- assessor observations:
  - development of scaled prototype
  - testing.

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

Photographic evidence which shows:

- sequence of photographs during the manufacture of the scaled prototype to include:
  - results of tool selection and usage
  - cutting and preparation of model components
  - connecting of model components
  - arrangement of model components in plan, elevation and detail
  - 3D view of the final scaled prototype.

Video evidence which shows:

- functionality of the scaled prototype.

Resources:

- copies of completed documentation from task 1
- material strength testing and measuring equipment
- hand tools
- modelling materials and components.

Task 3 – Peer review

As part of the development and design process it is critical that engineers can work constructively with others and consider feedback to inform designs to ensure they meet their purpose and requirements.

The assessor will set up the groups and make sure that you have access to copies of your design. You will present your design.

a) Prepare to present your design verbally using annotated sketches and diagrams.
b) Present and explain your design.
c) Peer reviewers will now have time to reflect on your design.
d) Discuss feedback from the group on your design presented in part b).
e) Peer reviewers will now complete the peer review feedback form.

Conditions of assessment:

- the time allocated for this task is **60 minutes**. This is broken down for the above tasks below:
  a) 10 minutes to prepare to present designs
  b) 10 minutes to present and explain designs
  c) 10 minutes for the peer review group to discuss and reflect on the design before providing feedback
  d) 15 minutes for the peer review group to discuss the design with you and ask you questions
  e) 15 minutes for the peer review group to provide collective feedback on the peer review form to submit to the assessor for approval
- the task must be supervised at all times
- you must use the feedback record form to make any notes and record any feedback to questions asked as part of the discussion. The peer group will also provide you with a Peer Review Form with feedback, which will have been checked for appropriateness by the assessor before being shared.

Controlled conditions:

- you must only work on the 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
- you must not share or discuss your work or the work of others outside the assessment time
- you are not permitted to bring any materials into the assessment session.

For parts a), b) and d) **you** must:

- proactively participate in the discussion
- manage your time
- seeks any clarity in the feedback given and be prepared to ask questions
- record any feedback notes on the feedback record form provided.

For parts c), d) and e) **peer reviewers** must:

- proactively engage in the discussion
- respond constructively and fairly
- ensure the peer review feedback form is completed fully and handed to the assessor.

What must be submitted:

- feedback record form
- peer review feedback form.

Resources

- copies of completed documentation from task 1
- feedback record form
- peer review feedback form(s).

Task 4 – Evaluation and implementation

You must:

a) produce a virtual model of the design using appropriate software incorporating any changes you have decided to make in response to feedback or as a result of manufacturing and testing
b) produce a revision control document or report that is typically 500 words justifying why changes were made or not made as a result of the peer review feedback
c) produce a report evaluating the proposed design. The report should typically be 800 words. This must include:
    - the information necessary for a third party to implement your prototype including health and safety considerations
    - an explanation of the test methods used and the reasons for their use and their limitations in relation to your scaled prototype
    - an evaluation of the fitness for purpose of the prototype and its conformance to the specification
    - any improvements or adaptions required to the prototype, including any reasoning and justifications if adaptions or improvements are not required.

Conditions of assessment:

- the time allocated for this task is **6 hours**
- you must carry out the task on your own, under **controlled conditions.**

Controlled conditions:

- you must only work on the tasks in the allocated times
- 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 materials into the assessment session.

What must be produced for marking:

- outcomes of virtual modelling
- revision control document
- evaluation and implementation report.

Resources:

- copies of completed documentation from tasks 1 and 2
- feedback record form and peer review form from task 3.
- Internet access for research (e.g. costs, component data and production information)
- manufacturer's datasheets (for materials and components)
- scientific calculator.

End of assessment

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