T-LEVELS | IfATE Institute for Apprenticeships and Technical Education

T Level in Engineering and Manufacturing for Design & Development

8714-321 Mechanical Occupational Specialism Report (Summer 2024)

Version 1.0

City & Guilds | eal

Version and date	Change detail	Section
1.0 08/08/24		

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Foreword

Summer 2024 Results

The occupational specialism qualification is made up of one component, which need to be successfully achieved to attain the T Level Mechanical Occupational Specialism.

We discussed the approach to standard setting/maintaining with Ofqual and the other awarding organisations before awarding this year. We have agreed to take account of the newness of qualifications in how we award this year to recognise that students and teachers are less familiar with the assessments (grading-arrangements-for-vtqsand-technical-qualifications-within-t-levels-in-the-academic-year-2023-to-2024), whilst also recognising the standards required for these qualifications.

Introduction

This document has been prepared to be used as a feedback tool for providers in order to support and enhance teaching and preparation for assessment. It is advised that this document is referred to when planning delivery and when preparing candidates for the T Level Technical Qualification (TQ) in Engineering and Manufacturing **Occupational Specialisms.**

This report provides general commentary on candidate performance in the occupational specialism assignment. It highlights common themes in relation to the technical aspects explored within the assessment, giving areas of strengths and weakness demonstrated by the cohort of candidates who sat assessments in the summer 2024 assessment series.

The grade boundaries that were used to determine candidate's final summer 2024 results are also provided. **For summer 2024, as per Ofqual guidance, the approach to grading recognises that these are new qualifications.**

8714-321 Occupational Specialism

Task 1 – Design:

Candidates are required to produce a detailed design specification that builds on the design criteria for the device in the assignment brief. Candidates then sketch and annotate drawings of potential designs, select an appropriate design and virtually model this utilising CAD software. Candidates must provide justification for their final design choice, supported with calculations, material and component selection supported by a bill of materials (BoM) for their final design proposal.

The higher performing candidates were able to generate design specifications for their prototype models showing consideration to safe assembly, manufacturing and safe operation with all aspects of the design criteria considered. The lower performing candidates were able to interpret the design criteria to generate a design specification focusing on safe operation but were not able to consider all design criteria requirements e.g. vertical, horizontal and grasping mechanisms, with many missing the horizontal and grasping criteria in their design proposals.

Candidates were required to select and justify materials and components needed for their proposed designs. The higher performing candidates were able to provide detailed bill of materials and comprehensive justifications incorporating scientific properties to support their material choices. Whereas the lower performing candidates provided some basic and unjustified material choices lacking understanding of material properties and the weight considerations of their design proposals.

Many candidates demonstrated excellent knowledge and understanding when generating drawings and diagrams. Many of the higher performing candidates provided excellent engineering diagrams and representations to convey their ideas with detailed orthographic drawings, assembly drawings and general arrangement drawings. Some candidates did not include tolerances or utilise the title blocks to industry standard. Most candidates could demonstrate good or excellent virtual modelling to convey assembly drawings, stress analysis and in some cases simulations of their design proposals. Some higher performing candidates were able to calculate the load applied to any components of the design that are subject to stress, as well as the mechanical advantage afforded by the design. Whereas the lower performing candidates did not provide an efficiency rating, design matrix or calculations to support their designs

Actions providers can take to support assessment preparation for future series:

Further develop candidates sketching skills to incorporate detailed annotations to incorporate the design criteria.

Support candidates' ability to incorporate calculations within their design proposals to determine load and stress as well as support their choices and decisions for materials options. scientific properties, efficiency and friction.

Task 2 – Manufacture and test:

Candidates are required to produce a risk assessment for the manufacturing and testing of their prototype, manufacture the prototype and test the operation of their prototype against the design criteria.

Many of the risk assessments for the lower performing candidates lacked risk ratings and were not able to demonstrate control measures or incorporate responses to suggest risks associated with tools and equipment but instead focused on generic safety of a work area lacking identification of risks towards user safety/others. The higher performing candidates developed comprehensive risk assessments considering the likelihood and severity for all risks and hazards, with risk mitigation methods identifying all potential risks.

Most candidates researched material properties incorporating metals, polymers and timbers for their 'real design concept' and opted for MDF and adhesives for their prototype model materials. Some candidates opted to use less appropriate materials e.g. cardboard for modelling which did not fully meet the requirements of the design criteria. The use of inappropriate prototype materials also resulted in poor test outcomes and tools selection and use was more limited with final products of poor quality.

The higher performing candidates incorporated high quality prototypes with various materials and different linkages, movement along a straight beam and pulley systems compared to the lower performing candidates who used MDF and adhesive.

Actions providers can take to support assessment preparation for future series:

Further develop candidates understanding of risk assessments ensuring candidates are aware of the importance of incorporating risk control measures for potential hazards of tools and equipment, work area and safety of operator and others.
Encourage candidates to design their prototypes using the resources specified, using the same materials for their design and prototype e.g. timber, metal, polymers.

Task 3 Peer review:

Candidates are required to present designs to their peers verbally using annotated sketches and diagrams, explaining their design. They are then required to collaborate with peers to inform their own design, and peer review other peers designs providing feedback.

This task is not awarded marks and is supplementary evidence to support candidates final design choices, of which they present in Task 4.

Some candidates provided detailed feedback forms to support evidence of peer discussions and presentations to help support and inform modifications to their design proposals.

Many candidates did not provide constructive feedback to enable peers to modify their design proposals lacking sufficient information to support improvements.

Actions providers can take to support assessment preparation for future series:

Ensure peer review feedback is checked prior to sharing with the candidate, to ensure it is appropriate and sufficient detail to inform design. Feedback should be realistic and meaningful to help inform the candidates final designs for Task 4.

Task 4 Evaluation and implementation:

Candidates are required to produce a virtual model of their final design taking into consideration changes from peer review, manufacturing or testing. Candidates are then required to produce a revision control document or report justifying why changes were/were not required and provide a report evaluating the final design.

Many candidates produced detailed drawings and concepts enabling a third party to reproduce the design.

The higher performing candidates provided detailed revision control documents incorporating modifications to their design proposals and prototype models following peer feedback to suggest why changes were or were not made with detailed justifications. Higher performing candidates were also able to support their decisions with calculations following analysis of operating efficiency from testing the function of their prototype. Supported with recordings of test results against the design criteria, visual and function tests along with assessing specific mechanical features for improvement. The lower performing candidates provided generic evaluations to their findings and superficial justifications relating to amendments that were implemented, showing limited knowledge of key design and development principles and processes.

Actions providers can take to support assessment preparation for future series:

Encourage candidates to produce more detailed drawings that include all required dimensions and material choices to ensure a third party can reproduce it. Support candidates to understand the importance of evaluating their proposals against the design criteria and design brief and then to identify areas for improvement where their design is not meeting the design criteria.
Candidates need more knowledge and understanding of test methods and their limitations to be able to then explain the testing methods they used and why, and the limitations of the testing methods they used.

Candidates need to further develop their understanding of and ability to include efficiency calculations to support their final design evaluation.

Encourage candidates to incorporate technical and industry terminology whilst producing their reports/records.

Best practice and guidance to providers on potential areas for improving performance in assessment

It is recommended that providers utilise and deliver the sample assessments as formative assessment to support candidates in preparation for summative assessment. This will not only help prepare candidates but will be an ideal opportunity for marker training and standardisation.

The centre staff and candidates must thoroughly read the assessment to ensure the work is carried out to the design criteria required. Moderators will be working to the assessment brief and marking grids and making judgements accordingly.

Appropriate PPE should be worn at all times and assessors should ensure that candidates are working safely and should not come to harm or risks to health from the materials, tools or equipment used in the assessment.

Where photographic evidence is requested ensure final prototypes are included.

Photographs do not need to be great in number but do need to show everything a moderator would require to be able to perform the remote moderation work. Photos need to be of sufficient resolution to enable “zooming in” to determine quality. Photographs should be collated into one document, and well labelled, and with commentary if possible.

Videos will need to show specific and important points of the assessment, for instance the candidate completing prototype testing/functionality.

Utilisation of the Photographic Evidence Guidance Document would support providers to capture relevant and valuable information for marking and moderation purposes to support practical observation feedback.

Providers should ensure that practical observation forms are detailed, covering all aspects of the activity being observed. The practical observation records should contain accurate information, specific to the candidate being observed and offer differentiating commentary between individual candidate’s performance utilising the marking grid terminology. They should also identify areas of strength and weakness to distinguish between the different qualities of performance and to facilitate accurate allocation of marks once all evidence has been submitted.

For future series it is important providers understand CAD files are not compatible and all images need to be screenshot and submitted in one document.

Ensure candidates have access to the workshop during task one to select from the resources that are outlined in the 8714-321 Physical Resource list. Ensuring candidates do not use materials and equipment that are not included within the Physical Resource List.

Support materials

Sample and Past Occupational Specialism (OS) Assessments:
It is recommended that Providers utilise and deliver the **sample OS** as well as **past OS** (if available) as formative assessment to support candidates in preparation for summative assessment.

Sample and past OS (if available): T Level Practical Assignment (Mechanical engineering) Assessor Pack Sample (cityandguilds.com)

Guide Standard Exemplification Material (GSEM) Assessments:
It is also recommended that Providers utilise the **GSEMs** to help understand the standard required to achieve a Distinction and Pass grade.

8714-321 OS Distinction GSEM: T Level Technical Qualification in Design and Development for Engineering and Manufacturing Mechanical engineering (cityandguilds.com)

8714-321 OS Pass GSEM: T Level Technical Qualification in Design and Development for Engineering and Manufacturing Mechanical engineering (cityandguilds.com)

TQ Occupational Specialism Assessment Process Guide:
The guide gives support to Providers in preparing for and delivering T Level Occupational Specialism assessments.

Link: TQ Occupational Specialism Assessment process guide (cityandguilds.com)

Events and Webinars:
City & Guilds run free webinars and events throughout the year on preparing for and delivering the T Level Occupational Specialisms. The below link provides details on upcoming in person events, live webinars, on-demand webinars and preparation for the Occupational specialism assessment.

Link: Events and webinars - T Levels | City & Guilds (cityandguilds.com)

Grade boundaries

The table below shows the grade mark ranges for the Occupational Specialism **for the summer 2024 series.**

Grade	Mark range 8714-321
Distinction	67-90
Merit	52-66
Pass	37-51
Unclassified (U)	0-36

Get in touch

The City & Guilds Quality team are here to answer any queries you may have regarding your T Level Technical Qualification delivery.

Should you require assistance, please contact us using the details below:

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Web chat available **here**.