ICTQual AB

Qualification Specification

Level 2 Diploma in Mechanical Engineering
30 Credits – 3 Months

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Qualification Specifications about

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About ICTQual AB

ICTQual AB UK Ltd. is a distinguished awarding body based in the United Kingdom, dedicated to fostering excellence in education, training, and skills development. Committed to global standards, ICTQual AB provides internationally recognized qualifications that empower individuals and organizations to thrive in an increasingly competitive world. Their offerings span diverse industries, including technical fields, health and safety, management, and more, ensuring relevance and adaptability to modern workforce needs.

The organization prides itself on delivering high-quality educational solutions through a network of Approved Training Centres worldwide. Their robust curriculum and innovative teaching methodologies are designed to equip learners with practical knowledge and skills for personal and professional growth. With a mission to inspire lifelong learning and drive positive change, ICTQual AB continuously evolves its programs to stay ahead of industry trends and technological advancements.

ICTQual AB's vision is to set benchmarks for educational excellence while promoting inclusivity and integrity. Their unwavering focus on quality and accessibility makes them a trusted partner in shaping future-ready professionals and advancing societal progress globally.

Course Overview

The ICTQual Level 2 Diploma in Mechanical Engineering is a comprehensive 3-month program, worth 30 credits, designed to provide learners with a strong foundation in mechanical engineering. This qualification covers core areas such as mechanics, material properties, and engineering design, with an emphasis on practical skills. Students will explore the principles of force, motion, and energy, learn about various engineering materials, and gain an introduction to CAD (Computer-Aided Design). These skills are vital for understanding and applying mechanical engineering concepts in real-world scenarios.

This diploma equips students for entry-level positions such as mechanical engineering assistant, junior design technician, or maintenance support specialist. It also serves as a stepping stone for further qualifications, including apprenticeships or higher-level diplomas in mechanical engineering. For those already employed in the industry, the qualification enhances career progression by reinforcing foundational knowledge and opening doors to specialization in areas like CAD design or manufacturing

Certification Framework

Qualification title	Level 2 Diploma in Mechanical Engineering 30 Credits – 3 Months
Course ID	ME0005
Qualification Credits	30 Credits
Course Duration	Three Months
Grading Type	Pass / Fail
Competency Evaluation	Coursework / Assignments / Verifiable Experience
Assessment	The assessment and verification process for ICTQual qualifications involves two key stages: **Internal Assessment and Verification:** ✓ Conducted by the staff at the Approved Training Centre (ATC). Ensures learners meet the required standards through continuous assessments. ✓ Internal quality assurance (IQA) is carried out by the centre's IQA staff to validate the assessment processes. **External Quality Assurance:** ✓ Managed by ICTQual AB verifiers, who periodically review the centre's assessment and IQA processes. ✓ Verifies that assessments are conducted to the required standards and ensures consistency across centres

Entry Requirements

To enroll in the ICTQual Level 2 Diploma in Mechanical Engineering 30 Credits – 3 Months, candidates must meet the following entry requirements:

- ✓ Applicants must be at least 16 years old.
- ✓ A minimum of Level 1 qualification (or equivalent) in a related field such as engineering, or science. Alternatively, applicants should have at least GCSEs or equivalent qualifications, including Mathematics and English.
- ✓ While no prior engineering experience is required, applicants with a background or basic exposure to technical or engineering concepts may find the course easier to navigate.
- ✓ For non-native English speakers, proof of English language proficiency.

Qualification Structure

This qualification comprises 3 mandatory units, totaling 30 credits. Candidates must successfully complete all mandatory units to achieve the qualification.

Mandatory Units		
Unit Ref#	**Unit Title**	**Credits**
ME0005-1	Mechanical Engineering Principles	10
ME0005-2	Engineering Materials and Processes	10
ME0005-3	Engineering Design Fundamentals	10

Centre Requirements

Even if a centre is already registered with ICTQual AB, it must meet specific requirements to deliver the ICTQual Level 2 Diploma in Mechanical Engineering 30 Credits – 3 Months. These standards ensure the quality and consistency of training, assessment, and learner support.

1. Approval to Deliver the Qualification

- ✓ Centres must obtain formal approval from ICTQual AB to deliver this specific qualification, even if they are already registered.
- ✓ The approval process includes a review of resources, staff qualifications, and policies relevant to the program.

2. Qualified Staff

- ✓ **Tutors:** Must have relevant qualifications in mechanical engineering or construction at Level 3 or higher, alongside teaching/training experience.
- ✓ **Assessors:** Must hold a recognized assessor qualification and demonstrate expertise in Mechanical Engineering.
- ✓ **Internal Quality Assurers (IQAs):** Must be appropriately qualified and experienced to monitor the quality of assessments.

3. Learning Facilities

Centres must have access to appropriate learning facilities, which include:

- ✓ **Classrooms:** Modern, well-equipped spaces with advanced multimedia tools to deliver engaging theoretical instruction in mechanical engineering concepts and design principles.
- ✓ **Practical Areas**: Hands-on training areas featuring cutting-edge tools, machinery, and equipment such as lathes, milling machines, welding stations, and 3D printers for real-world practice and assessments.
- ✓ **Technology Access:** High-performance computers with industry-standard software (e.g., CAD, CAM, FEA) and reliable internet connectivity to support technical design, analysis, and project work.

4. Health and Safety Compliance

- ✓ Centres must ensure that practical training environments comply with relevant health and safety regulations.
- ✓ Risk assessments must be conducted regularly to maintain a safe learning environment.

5. Resource Requirements

- ✓ **Learning Materials:** Approved course manuals, textbooks, and study guides aligned with the curriculum.
- ✓ **Assessment Tools:** Templates, guidelines, and resources for conducting and recording assessments.
- ✓ **E-Learning Systems:** If offering online or hybrid learning, centres must provide a robust Learning Management System (LMS) to facilitate remote delivery.

6. Assessment and Quality Assurance

- ✓ Centres must adhere to ICTQual's assessment standards, ensuring that all assessments are fair, valid, and reliable.
- ✓ Internal quality assurance (IQA) processes must be in place to monitor assessments and provide feedback to assessors.
- ✓ External verification visits from ICTQual will ensure compliance with awarding body standards.

7. Learner Support

- ✓ Centres must provide learners with access to guidance and support throughout the program, including:
- ✓ Academic support for coursework.
- ✓ Career guidance for future progression.
- ✓ Additional support for learners with specific needs (e.g., disabilities or language barriers).

8. Policies and Procedures

Centres must maintain and implement the following policies, as required by ICTQual:

- ✓ Equal Opportunities Policy.
- ✓ Health and Safety Policy.
- ✓ Safeguarding Policies and Procedures.
- ✓ Complaints and Appeals Procedure.
- ✓ Data Protection and Confidentiality Policy.

9. Regular Reporting to ICTQual

- ✓ Centres must provide regular updates to ICTQual AB on learner enrollment, progress, and completion rates.
- ✓ Centres are required to maintain records of assessments and learner achievements for external auditing purposes.

Support for Candidates

Centres should ensure that materials developed to support candidates:

- ✓ Facilitate tracking of achievements as candidates progress through the learning outcomes and assessment criteria.
- ✓ Include information on how and where ICTQual's policies and procedures can be accessed.
- ✓ Provide mechanisms for Internal and External Quality Assurance staff to verify and authenticate evidence effectively.

This approach ensures transparency, supports candidates' learning journeys, and upholds quality assurance standards.

Assessment

This qualification is competence-based, requiring candidates to demonstrate proficiency as defined in the qualification units. The assessment evaluates the candidate's skills, knowledge, and understanding against the set standards. Key details include:

1. **Assessment Process:**

   - ✓ Must be conducted by an experienced and qualified assessor.
   - ✓ Candidates compile a portfolio of evidence that satisfies all learning outcomes and assessment criteria for each unit.

2. **Types of Evidence:**

   - ✓ Observation reports by the assessor.
   - ✓ Assignments, projects, or reports.
   - ✓ Professional discussions.
   - ✓ Witness testimonies.
   - ✓ Candidate-produced work.
   - ✓ Worksheets.
   - ✓ Records of oral and written questioning.
   - ✓ Recognition of Prior Learning (RPL).

3. **Learning Outcomes and Assessment Criteria:**

   - ✓ **Learning Outcomes:** Define what candidates should know, understand, or accomplish upon completing the unit.
   - ✓ **Assessment Criteria:** Detail the standards candidates must meet to demonstrate that the learning outcomes have been achieved.

This framework ensures rigorous and consistent evaluation of candidates' competence in line with the qualification's objectives.

Unit Descriptors

ME0005 -1 Mechanical Engineering Principles

The aim of this study unit is to provide learners with a comprehensive understanding of the foundational principles of mechanical engineering, including the concepts of force, motion, and energy. It equips learners with the analytical skills necessary to assess basic mechanical systems using core laws of physics.

Learning Outcome:	Assessment Criteria:
1. Understand and explain the basic principles of mechanics, including force, motion, and energy.	1.1. Accurately define the fundamental concepts of mechanics, including force, motion, and energy. 1.2. Explain the relationship between force, motion, and energy using appropriate scientific principles. 1.3. Demonstrate an understanding of Newton's Laws of Motion and their applications in real-world scenarios. 1.4. Analyze and explain the various types of forces (e.g., gravitational, frictional, applied) and their effects on motion. 1.5. Discuss the concept of energy and its different forms, including kinetic, potential, and mechanical energy. 1.6. Apply the principle of conservation of energy to simple mechanical systems. 1.7. Identify and explain the basic equations used in mechanics, such as F=ma and the work-energy theorem. 1.8. Illustrate and explain how energy is transferred or transformed in mechanical processes. 1.9. Solve basic problems involving force, motion, and energy using appropriate formulas and units.
2. Analyze simple mechanical systems using fundamental laws of physics.	2.1. Demonstrate a clear understanding of basic mechanical systems and their components, identifying key elements involved in the system's operation. 2.2. Apply fundamental laws of physics, such as Newton's Laws of Motion, work-energy principles, and conservation of energy, to analyze mechanical systems. 2.3. Identify the forces acting on various parts of a

	mechanical system and calculate their effects based on physical principles. 2.4. Evaluate the motion of objects within a mechanical system, considering factors like velocity, acceleration, and force interactions. 2.5. Solve problems related to mechanical systems by calculating forces, energy, and power in different contexts, ensuring accuracy in computations. 2.6. Analyze static and dynamic systems, distinguishing between equilibrium conditions and non-equilibrium behavior. 2.7. Use mathematical models to predict the behavior of mechanical systems, ensuring correct application of formulas and physical constants. 2.8. Interpret experimental data and apply theoretical principles to validate the analysis of mechanical systems. 2.9. Communicate analysis findings effectively, presenting solutions to mechanical system problems in a clear and concise manner.
3. Identify key components of mechanical systems and their functions in industrial applications.	3.1. Identify and describe the key components of mechanical systems, such as gears, pulleys, belts, shafts, and bearings, within the context of industrial applications. 3.2. Explain the function of each component in terms of its role in transmitting force, motion, and energy within a mechanical system. 3.3. Analyze the integration of components to form a complete mechanical system, highlighting their interdependence in industrial processes. 3.4. Assess the operational conditions and limitations of each component, including factors such as load-bearing capacity, speed, and durability. 3.5. Recognize the materials commonly used for each component, considering their mechanical properties and suitability for specific industrial applications. 3.6. Examine the design principles involved in selecting and optimizing mechanical components for efficiency and performance in

	industrial settings. 3.7. Identify common failure modes of mechanical components in industrial systems and propose solutions or preventative measures. 3.8. Understand the importance of maintenance and monitoring of mechanical components to ensure optimal performance and reduce downtime in industrial applications. 3.9. Evaluate the impact of component selection on the overall cost, reliability, and sustainability of industrial mechanical systems.

ME0005 -2 Engineering Materials and Processes

The aim of this study unit is to provide learners with a comprehensive understanding of engineering materials and processes. It focuses on recognizing and describing the properties of common materials such as metals, polymers, and composites, as well as understanding the criteria for selecting appropriate materials for specific engineering applications.

Learning Outcome:	Assessment Criteria:
1. Recognize and describe the properties of common engineering materials such as metals, polymers, and composites.	1.1. Identify and classify common engineering materials, including metals, polymers, and composites, based on their basic properties and characteristics. 1.2. Describe the physical properties of metals, such as strength, ductility, hardness, and conductivity, and their relevance to engineering applications. 1.3. Recognize the types of polymers (thermoplastics, thermosets, elastomers) and describe their properties, including flexibility, chemical resistance, and thermal stability. 1.4. Explain the mechanical properties of composites, such as strength-to-weight ratio, stiffness, and impact resistance, and how they are engineered for specific uses. 1.5. Compare the advantages and limitations of different materials in terms of cost, ease of manufacturing, and performance in various environments. 1.6. Understand the impact of material properties on the design and functionality of engineering components and systems. 1.7. Describe the influence of temperature, pressure, and environmental factors on the properties of materials and their suitability for particular applications. 1.8. Identify the common testing methods used to evaluate the properties of materials, including tensile, hardness, and impact tests. 1.9. Recognize the role of material selection in ensuring safety, efficiency, and sustainability in engineering projects.
2. Understand the criteria for selecting materials for specific engineering applications.	2.1. Identify the key factors influencing material selection, including mechanical properties (strength, toughness, hardness), thermal properties (conductivity, expansion), and

	chemical resistance. 2.2. Evaluate the environmental conditions, such as temperature, humidity, and exposure to chemicals, that influence the performance and longevity of materials in specific applications. 2.3. Consider the economic aspects of material selection, including cost, availability, and ease of processing or manufacturing. 2.4. Assess the material's ability to meet the required durability, wear resistance, and fatigue strength in the context of the application. 2.5. Examine the material's environmental impact, including sustainability, recyclability, and compliance with environmental regulations. 2.6. Ensure compatibility with other materials in multi-material systems, considering issues like corrosion, wear, and thermal expansion. 2.7. Evaluate the manufacturing processes required for the material, including ease of fabrication, machining, welding, and joining techniques. 2.8. Consider the material's aesthetic properties and surface finish, where relevant, for consumer-facing products. 2.9. Balance performance requirements with practical constraints, ensuring material selection optimizes overall system performance and reliability.
3. Explain basic manufacturing processes, including machining, forming, and assembly.	3.1. Describe machining processes such as turning, milling, drilling, and grinding, focusing on how they are used to shape and refine materials by removing excess material. 3.2. Explain the principles of forming processes, including casting, forging, extrusion, and stamping, where materials are shaped by applying heat, pressure, or both. 3.3. Discuss the role of additive manufacturing (3D printing) in producing complex shapes by layer-by-layer material deposition. 3.4. Identify common assembly processes such as welding, brazing, soldering, and fastening, which join components together to form

	finished products. 3.5. Explain the use of non-traditional manufacturing processes like electrical discharge machining (EDM) and laser cutting, highlighting their applications in precision engineering. 3.6. Describe the factors influencing process selection, including material properties, part geometry, tolerances, and production volume. 3.7. Discuss the importance of quality control measures in manufacturing processes to ensure dimensional accuracy, surface finish, and overall product reliability. 3.8. Understand the concept of lean manufacturing and how it aims to reduce waste, improve efficiency, and optimize production workflows. 3.9. Recognize the impact of automation and digital technologies (e.g., CNC machines, robotic assembly) on modern manufacturing processes, improving speed and precision.

ME0005 -3 Engineering Design Fundamentals

The aim of this study unit is to provide learners with a foundational understanding of engineering design principles, emphasizing the importance of efficient and effective design processes. Through the exploration of basic technical drawings and schematics, learners will develop the ability to interpret and apply design concepts.

Learning Outcome:	Assessment Criteria:
1. Understand the principles of engineering design and the importance of efficient designs.	1.1. Understand the basic principles of engineering design, including problem definition, concept generation, detailed design, prototyping, and testing. 1.2. Recognize the importance of balancing functionality, performance, cost, and manufacturability in creating efficient engineering designs. 1.3. Consider the principles of ergonomics and user-centered design, ensuring that products are comfortable, safe, and accessible for users. 1.4. Evaluate the impact of design decisions on the sustainability of a product, including material selection, energy efficiency, and waste reduction. 1.5. Understand the role of design iteration, where designs are continuously refined based on feedback, testing, and performance analysis. 1.6. Apply the concept of design for manufacturability (DFM) to ensure that designs are easy to produce with minimal complexity and cost. 1.7. Emphasize the significance of reliability and durability in engineering designs, ensuring long-term functionality and minimal maintenance. 1.8. Incorporate safety considerations in design, adhering to industry standards, regulations, and best practices to protect users and the environment. 1.9. Understand how modern tools, such as computer-aided design (CAD) software and simulation techniques, improve the accuracy and efficiency of the design process.
2. Interpret basic technical drawings and	2.1. Understand and identify the key elements of

schematics.	technical drawings, including title blocks, scale, dimensions, and symbols used in various engineering disciplines. 2.2. Interpret orthographic projections, understanding views such as front, top, and side views to represent 3D objects in 2D space. 2.3. Recognize sectional views and their purpose in showing internal features of objects that are not visible in exterior views. 2.4. Understand the use of hidden lines, centerlines, and dimensioning techniques to indicate features that are not immediately visible or to represent part locations. 2.5. Identify and interpret common schematic symbols used in electrical, mechanical, and fluid systems, including those for components like resistors, motors, pumps, and valves. 2.6. Understand the conventions of tolerance and fits in technical drawings, recognizing how they define acceptable limits for part dimensions. 2.7. Read and interpret assembly drawings, which show how individual components are assembled into a complete product or system. 2.8. Recognize the importance of scale in technical drawings to ensure accurate representation of sizes and proportions. 2.9. Apply the information from technical drawings and schematics to visualize and communicate the design, assembly, or operation of mechanical or electrical systems.
3. Gain an introductory understanding of Computer-Aided Design (CAD) and its application in engineering design.	3.1. Understand the basic concepts and principles of Computer-Aided Design (CAD), including its role in creating, modifying, and optimizing engineering designs. 3.2. Identify the key features of CAD software, such as drawing tools, 3D modeling, simulation, and rendering capabilities. 3.3. Gain knowledge of different types of CAD systems, including 2D drafting, 3D modeling, and parametric design, and how they are applied in various engineering fields. 3.4. Learn how CAD tools help in visualizing

	complex designs, facilitating the creation of precise drawings, and improving design accuracy. 3.5. Understand the advantages of CAD over traditional hand-drawing methods, including enhanced design efficiency, ease of modification, and collaboration. 3.6. Explore the role of CAD in integrating with other engineering tools, such as Finite Element Analysis (FEA) and Computer-Aided Manufacturing (CAM), to optimize product performance and manufacturability. 3.7. Recognize how CAD systems support the creation of digital prototypes, enabling faster testing, iteration, and validation of designs. 3.8. Understand the importance of CAD in improving communication among team members, as well as with clients and manufacturers, through the sharing of digital files. 3.9. Explore the basic workflow of CAD software, from concept creation and drawing to 3D modeling and the preparation of technical drawings for production.

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