LICQual

LICQual Level 6 Diploma in Electrical Quality Control and Quality Assurance QC/QA

Qualification Specification

Address:

27 Old Gloucester Street, London, United Kingdom, WC1N 3AX

LICQual

Contents

Qualification Specification

About LICQual

LICQual is a globally recognized awarding body based in the United Kingdom. Renowned for its commitment to excellence in education, LICQual specializes in delivering high-quality qualifications designed to meet the evolving needs of international learners, professionals, and industries. LICQual is dedicated to fostering innovative and flexible learning pathways, providing learners with the tools and knowledge needed to excel in today's dynamic professional landscape. The organization emphasizes adherence to international qualification frameworks and standards, ensuring global recognition and applicability of its certifications.

The vision of LICQual is to establish itself as a global benchmark in quality education and skills development. Its mission is to equip individuals and organizations with internationally recognized qualifications that enhance employability, professional productivity, and academic progression.

Underpinned by a team of experienced professionals, including examiners, moderators, and assessors, LICQual ensures the highest standards of quality assurance and continuous improvement. Its qualifications are designed to empower individuals with the expertise and competencies necessary to thrive in today's competitive and ever-changing global environment.

Course Overview

The LICQual Level 6 Diploma in Electrical Quality Control and Quality Assurance (QC/QA) is a premier, advanced qualification designed to elevate the careers of professionals within the electrical engineering sector. This diploma provides students with the essential knowledge and practical skills required to excel in the critical areas of electrical quality control and assurance.

The curriculum is comprehensive, focusing on the critical areas of electrical quality control, assurance protocols, and industry regulations. It covers key aspects of quality management systems, detailed inspection techniques, and compliance standards necessary to maintain high-quality electrical operations. The qualification serves as a perfect stepping stone for professionals aiming to meet the growing demand for qualified QC/QA specialists in electrical engineering.

Course Objectives

The primary goal of this diploma is to provide graduates with the competence to ensure top-quality standards across electrical systems, processes, and projects. Upon completion of the course, students will be able to:

- Develop and implement robust quality assurance strategies tailored for electrical systems.
- Perform detailed inspections and testing using industry-standard techniques.

- Master the key aspects of quality management systems (QMS) and assurance protocols.
- Ensure compliance of electrical systems with both safety and performance criteria and all relevant industry regulations.
- Take on leadership roles in quality control and assurance within electrical engineering.

Aims of the Qualification

The overall aim of the LICQual Level 6 Diploma in Electrical Quality Control and Quality Assurance QC/QA is to prepare graduates to become leaders in the field of electrical quality control and assurance. The qualification aims to:

- Enhance current expertise in electrical quality standards and best practices.
- Equip professionals with the necessary tools for successful quality management in complex electrical projects.
- Bridge the gap between theoretical knowledge and hands-on application in QC/QA roles.
- Foster a deep understanding of compliance and auditing within the electrical sector.

Targeted Audience

This advanced diploma is ideally suited for ambitious professionals who are looking to formalize their expertise, advance their careers, or transition into specialized managerial and leadership roles. The target audience includes:

- Experienced Electrical Engineers seeking to specialize in quality assurance and control.
- QC/QA Technicians and Inspectors aiming for supervisory or managerial positions.
- Individuals working in compliance, auditing, or electrical testing who need to improve their specialized expertise.
- Professionals pursuing leadership and managerial roles in quality assurance within the electrical industry.

Certification Framework

Qualification title	**LICQual Level 6 Diploma in Electrical Quality Control and Quality Assurance QC/QA**
Course ID	LICQ2200139
Qualification Credits	120 Credits
Course Duration	3 - 6 Months
Grading Type	Pass / Fail
Competency Evaluation	Coursework / Assignments / Verifiable Experience
Assessment	The assessment and verification process for LICQual qualifications ensures that learners achieve the required standards and maintain consistency across all Approved Training Centres (ATCs). This process is divided into two key stages: **Internal Assessment and Verification:** ✓ This stage is conducted by the staff at the ATC, ensuring that learners meet the qualification standards through ongoing assessments. ✓ Internal Quality Assurance (IQA) is performed by the centre's designated IQA staff to validate and maintain the integrity of the assessment processes. **External Quality Assurance:** ✓ This stage is overseen by LICQual AB verifiers, who periodically review the centre's assessment and IQA procedures. ✓ The external verification ensures that assessments adhere to the required standards and that consistent practices are maintained across all centres.

Entry Requirements

To enroll in the LICQual Level 6 Diploma in Electrical Quality Control and Quality Assurance (QC/QA), applicants must meet the following criteria:

- **Age Requirement:** Applicants must be at least 16 years old.
- **Educational Requirements:** A minimum of a Level 4 or Level 5 qualification in electrical engineering, quality management, or a related field is required. Alternatively, candidates with a bachelor's degree in electrical engineering, quality assurance, or a similar discipline will also be considered.
- **Experience:** While no prior work experience is mandatory, candidates with at least 2 years of relevant experience in electrical engineering, quality control, or quality assurance (QC/QA) will be given preference.
- **English Language Proficiency:** As the course is delivered in English, applicants must demonstrate proficiency in the English language through a recognized qualification, such as IELTS with a minimum score of 6.0, or an equivalent test.

Qualification Structure

This qualification comprises 6 mandatory units, totalling 120 credits. Candidates must successfully complete all mandatory units to achieve the qualification.

Mandatory Units		
Unit Ref#	**Unit Title**	**Credits**
LICQ2200139-1	Advanced Quality Management Systems in Electrical Engineering	20
LICQ2200139-2	International Standards and Regulatory Compliance for Electrical Systems	20
LICQ2200139-3	Electrical Testing, Inspection, and Performance Evaluation	20
LICQ2200139-4	Risk Management and Safety in Electrical Quality Control	20
LICQ2200139-5	Root Cause Analysis (RCA) and Corrective Actions in Electrical Systems	20
LICQ2200139-6	Performance Monitoring and Continuous Improvement in Electrical Systems	20

Centre Requirements

To deliver the LICQual Level 6 Diploma in Electrical Quality Control and Quality Assurance QC/QA, training centres must meet the following key requirements:

1. ***Approval from LICQual:***
   - Centres must be formally approved by LICQual to deliver this specific qualification, ensuring alignment with quality standards.
2. ***Qualified Staff:***
   - Tutors and assessors must possess relevant academic qualifications (minimum Level 6 in Electrical Engineering or Quality Management) and extensive, current professional experience in electrical quality control and quality assurance leadership or compliance.
3. ***Learning Facilities:***
   - Centres must provide suitable classrooms, access to environmental legislation and monitoring tools (e.g., sensors, lab kits), and digital learning resources.
4. ***Health and Safety Compliance:***
   - All learning and practical environments must comply with current health and safety regulations.
5. ***Assessment Resources:***
   - Centres should maintain appropriate tools, templates, and systems to support consistent and fair assessment.
6. ***Learner Support:***
   - Support must be available for all learners, including academic guidance, disability accommodations, and career development support.
7. ***Policies and Procedures:***
   - Centres must implement core policies (e.g., Equality, Safeguarding, Complaints, Data Protection) to maintain educational quality and integrity.
8. ***Reporting to LICQual:***

- Centres are required to regularly report learner progress, maintain records of assessments, and support LICQual in external verification.

Support for Candidates

Centres must ensure that materials developed to support candidates:

- Enable the tracking of learners' progress as they achieve the specified learning outcomes and assessment criteria.
- Provide clear guidance on accessing LICQual's policies and procedures.
- Establish robust mechanisms to allow Internal and External Quality Assurance personnel to verify and authenticate evidence efficiently.

This structured approach promotes transparency, enhances the learning experience for candidates, and ensures adherence to high-quality assurance standards.

Assessment

Part 1: Knowledge and Understanding

- **Written Assignments and Research Projects:** Learners are required to complete structured written tasks and independent research projects that demonstrate advanced knowledge of health and social care management theories, policies, and practices. These assignments allow learners to critically analyse concepts and apply them to real-world contexts.
- **Oral and Written Questioning:** Learners will participate in structured oral or written questioning sessions, where they will be assessed on their comprehension of complex issues such as leadership, ethics, policy frameworks, and quality management in health and social care.

Part 2: Practical Application

- **Assessor Observation and Professional Discussions:** Learners will be observed in real or simulated workplace environments to evaluate their practical application of management and leadership skills. Professional discussions with assessors will further assess decision-making, problem-solving, and reflective thinking abilities.
- **Case Studies and Problem-Solving Exercises:** Learners will engage with detailed case studies and simulated scenarios, where they must identify problems, propose strategies, and justify their decisions using evidence-based practices and relevant care standards.

Part 3: Evidence and Verification

- **Portfolio of Evidence:** Learners will compile a portfolio containing reports, audits, presentations, reflective journals, and other forms of evidence produced during their training or workplace practice. This portfolio provides a comprehensive record of competence and progression.
- **Witness Testimonies and Recognition of Prior Learning (RPL):** Verified statements from supervisors or managers may be used to confirm learner competence, while credit for prior experience and previously achieved qualifications can also be recognised to support progression.

Unit Descriptors

LICQ2200139-1 Advanced Quality Management Systems in Electrical Engineering

This unit explores the principles, design, and implementation of high-level Quality Management Systems (QMS) specifically for complex electrical projects. It covers QMS frameworks like ISO 9001, focusing on auditing, documentation control, and process mapping to ensure organizational quality culture and strategic alignment with industry best practices.

Learning Outcome:	1. Understand the principles and components of advanced quality management systems (QMS) in electrical engineering.
Assessment Criteria:	1.1. Understand the principles and components of advanced quality management systems (QMS) in electrical engineering. 1.2. Critically explain the theoretical underpinnings of three distinct advanced QMS models relevant to electrical infrastructure. 1.3. Differentiate between the conceptual and technological components of modern electrical QMS, including their advanced features (e.g., data analytics integration). 1.4. Justify how QMS principles enable the creation of new procedures for addressing unpredictable electrical project scenarios. 1.5. Evaluate the interaction of multiple, complex factors (e.g., design volatility, supply chain risks) within a QMS framework.
Learning Outcome:	2. Evaluate the role of quality management systems in ensuring compliance with industry standards and regulations.
Assessment Criteria:	2.1. Evaluate the role of quality management systems in ensuring compliance with industry standards and regulations. 2.2. Critically evaluate the role of QMS in driving compliance with highly technical, sector-specific electrical standards (e.g., high-voltage safety codes). 2.3. Determine the influence of QMS maturity on international market access and tendering for complex electrical contracts. 2.4. Assess how QMS provides a responsive framework for managing compliance when standards are conflicting or rapidly evolving. 2.5. Analyze case studies to demonstrate how QMS deficiencies directly resulted in significant regulatory penalties or operational hazards.
Learning Outcome:	3. Design and implement quality control measures within electrical engineering projects to enhance performance and reliability.
Assessment Criteria:	3.1. Design and implement quality control measures within electrical engineering projects to enhance performance and reliability. 3.2. Design a complete, multi-layered quality control plan for a complex, multi-factor electrical system installation (e.g., a renewable energy plant connection). 3.3. Develop and refine a set of adaptable quality gates to address ill-defined or novel design challenges within a project lifecycle. 3.4. Demonstrate the advanced practical skills required to implement the designed QC measures in a simulated or real-world project environment.

	3.5. Justify the selection of specific advanced measurement tools used to monitor performance and reliability metrics of new electrical components.
Learning Outcome:	4. Assess the effectiveness of various QMS frameworks (e.g., ISO 9001) in the electrical engineering context.
Assessment Criteria:	4.1. Assess the effectiveness of various QMS frameworks (e.g., ISO 9001) in the electrical engineering context. 4.2. Critically analyse the effectiveness of the ISO 9001 framework when applied to unpredictable, cutting-edge electrical technology development. 4.3. Compare and contrast the implementation methodologies of two distinct QMS frameworks in a specific electrical industry sector (e.g., oil and gas vs. utilities). 4.4. Determine and apply a set of performance indicators to evaluate the actual impact of a chosen QMS on measurable electrical system output metrics. 4.5. Interpret the core theoretical differences between process-based and risk-based QMS approaches in the context of electrical safety and quality.
Learning Outcome:	**5.** Apply tools and techniques to monitor and improve quality standards in electrical systems and processes.
Assessment Criteria:	5.1. Apply tools and techniques to monitor and improve quality standards in electrical systems and processes. 5.2. Select and apply appropriate advanced statistical process control (SPC) techniques to monitor variation in a critical electrical manufacturing process. 5.3. Use digital monitoring tools to establish a real-time tracking system for quality standards in a complex electrical network. 5.4. Propose and justify corrective actions based on the critical analysis of monitoring data from a multi-sensor electrical system.

LICQ2200139-2 International Standards and Regulatory Compliance for Electrical Systems

This unit provides an in-depth study of global and regional electrical codes and regulatory frameworks (e.g., IEC, NEC). Learners will master interpreting standards, managing the compliance process, performing regulatory audits, and mitigating legal risks associated with non-compliance in electrical installations, systems, and components.

Learning Outcome:	1. Understand the international standards governing electrical systems (e.g., IEC, ISO) and their global implications.
Assessment Criteria:	1.1. Understand the international standards governing electrical systems (e.g., IEC, ISO) and their global implications. 1.2. Critically discuss the theoretical foundation and political evolution of major global electrical standards organizations (e.g., IEC, IEEE). 1.3. Explain the conceptual differences between prescriptive and performance-based international electrical standards. 1.4. Differentiate the global implications of adopting a regional standard (e.g., North American UL) versus an international standard (e.g., IEC) for trade and market entry. 1.5. Analyze the interdependencies between national regulations and overarching international standards in electrical design and installation.
Learning Outcome:	2. Analyze the regulatory requirements for electrical systems across different regions and industries.
Assessment Criteria:	2.1. Analyze the regulatory requirements for electrical systems across different regions and industries. 2.2. Critically analyze the divergent regulatory requirements for a single electrical product across three different global regions. 2.3. Evaluate the underlying rationale (e.g., historical safety, local grid specifics) for the variations in regional electrical regulations. 2.4. Determine the critical technical thresholds and mandatory features required for compliance in a highly specific industrial context (e.g., marine or aerospace). 2.5. Synthesize complex, often conflicting, regulatory information into a cohesive compliance plan for a multinational electrical project.
Learning Outcome:	3. Demonstrate knowledge of the compliance process for electrical systems with relevant national and international standards.
Assessment Criteria:	3.1. Demonstrate knowledge of the compliance process for electrical systems with relevant national and international standards. 3.2. Develop a comprehensive compliance roadmap detailing the stages of testing, documentation, and certification for a novel electrical system. 3.3. Apply advanced cognitive skills to address the ambiguous or limited definitions found in emerging technical standards. 3.4. Critically analyse the role of third-party certification bodies and their specific testing methodologies in the compliance process. 3.5. Formulate a robust technical submission package that clearly demonstrates compliance against multiple interacting standards.
Learning Outcome:	4. Evaluate the impact of non-compliance on safety, performance, and operational efficiency.

Assessment Criteria:	4.1. Evaluate the impact of non-compliance on safety, performance, and operational efficiency. 4.2. Critically evaluate the ethical and professional impact of intentional non-compliance on long-term organizational reputation and liability. 4.3. Quantify the potential operational impact (e.g., downtime, reduced lifespan) resulting from non-compliance in a mission-critical electrical system. 4.4. Analyze a historical case study of non-compliance to identify the systemic failures in quality assurance that led to the incident. 4.5. Determine effective strategies for retrofitting non-compliant electrical systems while maintaining service continuity and managing interacting safety risks.
Learning Outcome:	5. Apply regulatory guidelines to ensure electrical systems are compliant with safety, environmental, and technical standards.
Assessment Criteria:	5.1. Apply regulatory guidelines to ensure electrical systems are compliant with safety, environmental, and technical standards. 5.2. Select and apply appropriate regulatory guidelines to define the technical specifications for a sustainable and environmentally compliant electrical installation. 5.3. Use advanced practical skills to verify system documentation against environmental and safety standards during a final site inspection. 5.4. Adapt complex technical specifications derived from regulatory documents into clear, executable work instructions for field engineers operating in diverse contexts.

LICQ2200139-3 Electrical Testing, Inspection, and Performance Evaluation

This unit focuses on advanced hands-on techniques for inspecting, testing, and commissioning electrical systems. It covers functional, performance, and diagnostic testing methods, non-destructive testing, analysing test data, and evaluating system reliability and efficiency against required specifications and safety standards.

Learning Outcome:	1. Understand the key principles of electrical testing and inspection methods for electrical systems and components.
Assessment Criteria:	1.1. Understand the key principles of electrical testing and inspection methods for electrical systems and components. 1.2. Critically explain the scientific principles underpinning advanced diagnostic testing methods (e.g., Partial Discharge, Tan Delta testing). 1.3. Differentiate between the theoretical objectives of functional testing, performance testing, and reliability-centered maintenance (RCM) inspection. 1.4. Analyze how different component failure theories influence the selection and sequence of inspection methods. 1.5. Evaluate the trade-offs between intrusive and non-intrusive testing techniques in terms of data fidelity and operational impact. 1.6. Justify the methodology for combining multiple, interacting testing results to achieve a holistic system assessment.
Learning Outcome:	2. Apply various testing methods (e.g., functional, performance, and diagnostic testing) to evaluate electrical systems.
Assessment Criteria:	2.1 Apply various testing methods (e.g., functional, performance, and diagnostic testing) to evaluate electrical systems. 2.2 Determine and apply a novel performance testing protocol for an electrical system with a limited definition of optimal operation. 2.3 Demonstrate advanced cognitive and practical skills to execute complex, multi-stage diagnostic testing on a high-voltage system. 2.4 Refine existing standard testing procedures to account for unique environmental or loading conditions (many interacting factors). 2.5 Use advanced data logging and analysis tools to acquire and process multi-parameter test data effectively. 2.6 Propose a technological solution for automating the functional testing of a modular electrical assembly. 2.7 Adapt existing test setups to accommodate a wide and unpredictable variety of component sizes and specifications.
Learning Outcome:	3. Analyze test results and assess the performance of electrical systems based on international standards.
Assessment Criteria:	3.1 Analyze test results and assess the performance of electrical systems based on international standards. 3.2 Critically analyze raw, multi-channel test data to identify subtle anomalies and complex correlation patterns indicating underlying performance issues. 3.3 Interpret deviations from international standard tolerances to quantify the risk profile and remaining useful life (RUL) of the electrical asset.

	3.4 Evaluate system performance against both design specifications and established industry benchmarks, justifying any disparities. 3.5 Determine the theoretical root causes of complex, non-linear performance degradation based on diagnostic test results. 3.6 Synthesize findings from different testing methodologies (e.g., thermal imaging, vibration, electrical parameters) into a unified performance report.
Learning Outcome:	4. Implement appropriate inspection techniques to ensure safety, quality, and reliability in electrical systems.
Assessment Criteria:	4.1. Implement appropriate inspection techniques to ensure safety, quality, and reliability in electrical systems. 4.2. Design and implement a systematic, condition-based inspection schedule for critical electrical assets in an industrial setting. 4.3. Select and justify the use of specialized non-destructive testing (NDT) equipment for particular material and failure modes. 4.4. Demonstrate the advanced practical skills required to conduct specialized inspections (e.g., cable insulation resistance, earthing system integrity). 4.5. Develop an inspection checklist that comprehensively addresses safety, quality, and reliability factors simultaneously for a complex system.
Learning Outcome:	5. Identify performance issues in electrical systems through systematic testing and propose solutions for improvement.
Assessment Criteria:	5.1. Identify performance issues in electrical systems through systematic testing and propose solutions for improvement. 5.2. Apply a structured problem-solving approach to isolate the source of an intermittent and ill-defined performance issue in an electrical system. 5.3. Propose and justify a set of practical, innovative solutions for three distinct identified performance issues. 5.4. Create a detailed report linking observed performance issues directly to system failure modes and effects.

LICQ2200139-4 Risk Management and Safety in Electrical Quality Control

This unit teaches systematic approaches to identifying, assessing, and mitigating quality and safety risks in electrical engineering projects. It covers hazard analysis, developing risk management frameworks (like FMEA), applying safety protocols, and ensuring strict adherence to occupational health and safety regulations in high-voltage environments.

Learning Outcome:	1. Understand the principles of risk management in electrical systems, including hazard identification and risk assessment.
Assessment Criteria:	1.1. Understand the principles of risk management in electrical systems, including hazard identification and risk assessment. 1.2. Critically explain the theoretical models of risk (e.g., ALARP, Bow-tie analysis) and their application in electrical engineering. 1.3. Differentiate between proactive (e.g., FMEA) and reactive (e.g., incident investigation) hazard identification methodologies. 1.4. Evaluate the conceptual challenge of accurately quantifying risk severity for low-probability, high-consequence electrical hazards. 1.5. Justify how risk management creates a framework for decision-making in unpredictable electrical project environments. 1.6. Analyze the interaction between technical, human, and organizational factors in complex electrical risk scenarios.
Learning Outcome:	2. Analyze potential safety risks in electrical systems and recommend effective risk mitigation strategies.
Assessment Criteria:	2.1 Analyze potential safety risks in electrical systems and recommend effective risk mitigation strategies. 2.2 Conduct a critical risk assessment for an electrical system installation that involves multiple, interacting external factors (e.g., weather, civil works). 2.3 Determine the advanced technical risk mitigation strategies required for newly introduced, unproven electrical technologies. 2.4 Propose and justify the implementation of layered defense mechanisms to address high-level safety risks (e.g., arc flash or electric shock). 2.5 Analyze the limitations of standard safety practices when applied to complex, non-standard maintenance procedures. 2.6 Evaluate the ethical responsibility of the QC/QA professional in recommending risk mitigation for cost-sensitive projects. 2.7 Create a matrix that links identified safety hazards directly to appropriate industry standards and best practices.
Learning Outcome:	3. Apply risk management frameworks (e.g., FMEA, Fault Tree Analysis) to evaluate safety and quality in electrical engineering projects.
Assessment Criteria:	3.1 Apply risk management frameworks (e.g., FMEA, Fault Tree Analysis) to evaluate safety and quality in electrical engineering projects. 3.2 Apply the Failure Modes and Effects Analysis (FMEA) framework to a critical electrical sub-system, determining and ranking the most significant failure modes.

	3.3 Use Fault Tree Analysis (FTA) to systematically trace back the complex combination of events that could lead to a catastrophic electrical system failure. 3.4 Demonstrate advanced cognitive skills to adapt a standard risk framework to assess safety and quality simultaneously within a design review. 3.5 Determine and refine the appropriate weighting factors used in quantitative risk ranking when data is limited. 3.6 Justify the selection of a specific risk acceptance criterion based on the operational context and regulatory environment. 3.7 Create a detailed action plan to address the highest-ranked risks identified through the chosen framework.
Learning Outcome:	4. Evaluate the effectiveness of safety protocols and standards in managing electrical system risks.
Assessment Criteria:	4.1. Evaluate the effectiveness of safety protocols and standards in managing electrical system risks. 4.2. Critically evaluate the effectiveness of an existing lockout/tagout (LOTO) procedure in a multi-jurisdictional, complex electrical maintenance scenario. 4.3. Assess the suitability of current safety standards (e.g., electrical safety programs) for managing the risks associated with cutting-edge electrical technologies. 4.4. Analyze near-miss reports to identify systemic weaknesses in existing safety protocols and standards. 4.5. Propose data-driven modifications to safety training and protocols based on performance metrics and incident analysis.
Learning Outcome:	5. Implement safety measures to reduce risks and improve safety outcomes in electrical quality control processes.
Assessment Criteria:	5.1. Implement safety measures to reduce risks and improve safety outcomes in electrical quality control processes. 5.2. Design and implement a procedural change to improve worker safety during a high-risk electrical QC inspection process. 5.3. Apply advanced practical skills to verify the correct installation and functionality of specialized electrical safety equipment. 5.4. Develop a method for auditing compliance with new safety measures across a wide and unpredictable variety of field sites.

LICQ2200139-5 Root Cause Analysis (RCA) and Corrective Actions in Electrical Systems

This unit provides the tools and techniques necessary for investigating electrical system failures and non-conformities. Learners will use RCA methodologies (e.g., 5 Whys, Fishbone diagrams) to identify underlying causes, develop effective corrective and preventative action plans (CAPA), and implement long-term quality improvements.

Learning Outcome:	1. Understand the concept and methodology of Root Cause Analysis (RCA) in electrical systems.
Assessment Criteria:	1.1. Understand the concept and methodology of Root Cause Analysis (RCA) in electrical systems. 1.2. Critically explain the theoretical differences between symptom, immediate cause, and root cause in the context of electrical system failures. 1.3. Differentiate between the structural and systemic application of RCA across a wide variety of contexts (e.g., design failure vs. maintenance failure). 1.4. Analyze the philosophical and methodological underpinnings of three prominent RCA models (e.g., change analysis, barrier analysis). 1.5. Evaluate the challenges and limitations of applying RCA to problems that have a limited, ill-defined scope. 1.6. Justify the use of RCA as a continuous improvement tool rather than a purely forensic process.
Learning Outcome:	2. Apply various RCA techniques (e.g., Fishbone Diagram, 5 Whys) to identify the underlying causes of electrical system failures or inefficiencies.
Assessment Criteria:	2.1 Apply various RCA techniques (e.g., Fishbone Diagram, 5 Whys) to identify the underlying causes of electrical system failures or inefficiencies. 2.2 Apply the Fishbone Diagram technique to systematically categorize the multiple, interacting contributing factors to a specific electrical component failure. 2.3 Execute the '5 Whys' technique in a complex scenario involving a cascaded electrical system failure, tracing the cause back to a systemic deficiency. 2.4 Select and apply an appropriate quantitative RCA technique (e.g., statistical analysis) to analyse a population of recurrent electrical faults. 2.5 Demonstrate advanced cognitive skills to adapt a standard RCA technique to analyse a novel or unpredictable failure mode. 2.6 Use advanced practical skills to gather and organize complex data (e.g., SCADA logs, sensor readings) for RCA investigation. 2.7 Create a visual timeline of events and causal factors for an incident involving multiple preceding failures.
Learning Outcome:	3. Evaluate the impact of identified root causes on system performance and safety.
Assessment Criteria:	3.1 Evaluate the impact of identified root causes on system performance and safety. 3.2 Critically evaluate the short-term and long-term financial impact of a systemic root cause on organizational performance and liability. 3.3 Quantify the effect of an identified root cause on key system performance indicators (e.g., Mean Time Between Failures - MTBF). 3.4 Analyze the safety implications of a specific root cause, focusing on the potential for recurrence and severity of harm.

	3.5 Determine the influence of a root cause on related processes or systems that were not initially investigated. 3.6 Justify how a root cause analysis addresses both technical deficiencies and underlying management or procedural failures. 3.7 Evaluate the trade-off between the cost of implementing a corrective action and the cost of the risk associated with the root cause. 3.8 Synthesize RCA findings into a concise management report that clearly translates technical failure into actionable business context.
Learning Outcome:	4. Design corrective actions based on RCA findings to address electrical system issues and prevent recurrence.
Assessment Criteria:	4.1. Design corrective actions based on RCA findings to address electrical system issues and prevent recurrence. 4.2. Design a set of layered, preventative corrective actions addressing the technical, procedural, and organizational elements of a single root cause. 4.3. Develop a clear justification for why the proposed corrective action is the optimal solution given resource and operational constraints. 4.4. Refine the corrective action plan to ensure its viability across a wide and often unpredictable variety of operating environments. 4.5. Create a documented implementation plan detailing resource allocation, responsibilities, and key performance indicators for success.
Learning Outcome:	5. Monitor the implementation of corrective actions to ensure continuous improvement in electrical systems.
Assessment Criteria:	5.1. Monitor the implementation of corrective actions to ensure continuous improvement in electrical systems. 5.2. Establish appropriate performance metrics and monitoring methods to verify the sustained effectiveness of corrective actions. 5.3. Apply advanced cognitive skills to evaluate monitoring data to determine if the corrective action has inadvertently introduced new system risks. 5.4. Develop a formal procedure for communicating the success or failure of corrective actions to all relevant stakeholders.

LICQ2200139-6 Performance Monitoring and Continuous Improvement in Electrical Systems

This unit covers establishing performance indicators (KPIs) and applying statistical process control (SPC) to monitor electrical system efficiency. It focuses on using data logging, SCADA systems, and continuous improvement models (e.g., Six Sigma, PDCA) to drive optimization and sustain a culture of ongoing quality excellence.

Learning Outcome:	1. Understand the principles of performance monitoring and continuous improvement in electrical systems.
Assessment Criteria:	1.1. Understand the principles of performance monitoring and continuous improvement in electrical systems. 1.2. Critically explain the theoretical principles of key performance indicators (KPIs) and their role in a continuous improvement cycle (e.g., Deming Cycle). 1.3. Differentiate between leading and lagging performance metrics and their appropriate application in electrical system management. 1.4. Analyze how the philosophy of Total Quality Management (TQM) underpins modern electrical performance monitoring frameworks. 1.5. Evaluate the conceptual basis for setting performance benchmarks when dealing with novel or unique electrical installations. 1.6. Justify the need for adapting monitoring principles when the system definition is limited or the operational context involves many interacting factors.
Learning Outcome:	2. Apply performance metrics and indicators to assess the efficiency and effectiveness of electrical systems.
Assessment Criteria:	2.1 Apply performance metrics and indicators to assess the efficiency and effectiveness of electrical systems. 2.2 Determine and apply a balanced set of performance metrics (e.g., availability, efficiency, quality rate) tailored to a complex industrial electrical system. 2.3 Use advanced cognitive skills to establish predictive indicators for potential failure in critical, ill-defined system components. 2.4 Demonstrate the advanced practical skills required to collect and aggregate performance data from disparate and heterogeneous sources. 2.5 Analyze collected data using advanced statistical tools to establish baseline performance and identify statistically significant trends. 2.6 Refine existing industry-standard metrics to more accurately reflect the specific operational goals of a unique electrical utility. 2.7 Create a robust dashboard that visualizes complex performance data in a clear and actionable format for decision-makers.
Learning Outcome:	3. Evaluate the use of monitoring tools and techniques (e.g., SCADA, data logging) to track system performance.
Assessment Criteria:	3.1. Evaluate the use of monitoring tools and techniques (e.g., SCADA, data logging) to track system performance. 3.2. Critically evaluate the strengths and weaknesses of advanced monitoring tools (e.g., SCADA, distributed sensor networks) for specific electrical applications. 3.3. Analyze the data integration challenges presented by using multiple, legacy, and modern monitoring tools simultaneously.

	3.4. Determine the methodological steps required to ensure data integrity and security when utilizing cloud-based data logging techniques. 3.5. Justify the selection of a specific data sampling rate and resolution based on the dynamic nature and complexity of the electrical system being monitored. 3.6. Evaluate the economic return on investment (ROI) for implementing a specific monitoring technology in a large-scale project. 3.7. Propose new technological ways forward for using edge computing to process monitoring data in real-time at the source. 3.8. Assess the operational competence required by personnel to effectively utilize and maintain complex monitoring infrastructure.
Learning Outcome:	4. Design strategies for continuous improvement to optimize the performance of electrical systems.
Assessment Criteria:	4.1. Design strategies for continuous improvement to optimize the performance of electrical systems. 4.2. Design a complete continuous improvement strategy for an electrical maintenance department, focusing on reducing recurring system failures. 4.3. Develop and justify a pilot project methodology for testing the effectiveness of a proposed performance optimization initiative. 4.4. Refine an existing improvement strategy to address constraints imposed by a wide and unpredictable variety of contexts (e.g., remote locations). 4.5. Create a communication plan to facilitate cross-functional collaboration required for implementing system-wide improvements.
Learning Outcome:	5. Assess the impact of continuous improvement initiatives on system reliability, efficiency, and sustainability.
Assessment Criteria:	5.1. Assess the impact of continuous improvement initiatives on system reliability, efficiency, and sustainability. 5.2. Apply established audit techniques to quantitatively assess the long-term impact of a continuous improvement initiative on system reliability metrics. 5.3. Evaluate the effectiveness of an initiative in addressing the complex, underlying root causes rather than just the symptoms. 5.4. Determine the lessons learned from a completed initiative and propose how this knowledge should be integrated into future project planning and design procedures.

LICQual UK LTD

Address
27 Old Gloucester Street, London,
United Kingdom, WC1N 3AX

Contact Us
+44 744 139 8083

Website

Email

Visit Official Web page