WM9F8-15 Quality, Reliability and Maintenance

26/27

Department
WMG
Level
Taught Postgraduate Level
Module leader
Jane Marshall
Credit value
15
Module duration
4 weeks
Assessment
100% coursework
Study location
University of Warwick main campus, Coventry

Description

Introductory description

Product and service quality remain critical drivers of business success, contributing to enhanced customer satisfaction, reduced cycle times and operational costs, and the elimination of defects and rework. In an increasingly digital and data-driven environment, organisations rely on advanced quality management systems and emerging technologies to improve profitability and maintain competitiveness.

This module provides an opportunity to explore contemporary quality management theories alongside technology-enabled practices, including the use of statistical process control (SPC), digital quality monitoring, and data analytics for real-time decision making. Students will develop practical skills in applying key quality and reliability tools and techniques supported by modern technologies such as automation, sensor-based inspection, and AI-assisted defect detection.

The module also expands student knowledge of maintenance methodologies by introducing predictive and prescriptive maintenance concepts powered by Industrial Internet of Things (IIoT) devices, condition monitoring systems, and reliability-centred maintenance (RCM) frameworks. By examining digital asset management platforms and lifecycle management tools, students will learn how organisations optimise equipment availability, improve system reliability, and manage physical assets through integrated, technology-driven approaches.

Module aims

To develop the skills and knowledge of Quality, Reliability and Maintenance by: critically evaluating Quality Management methodologies and tools, capturing customers' requirements using Quality Function Deployment, exploring design for reliability concepts and techniques such as Failure Modes and Effects Analysis, Reliability Testing and Fault Tree Analysis, analysis of lifetime data to measure reliability performance, critical evaluation of maintenance methods and thus the importance of equipment asset management to any business organisation.

Outline syllabus

This is an indicative module outline only to give an indication of the sort of topics that may be covered. Actual sessions held may differ.

- Introduction to Quality, Reliability, and Maintenance concepts
- Comparison of Quality Management philosophies
- Application of Quality Tools – SPC and Root Cause Analysis
- Application of Reliability and Maintenance tools - FMEA, FTA, RBD
- Reliability Testing approaches – ALT, HALT, ESS, HASS
- Measuring quality and reliability using process capability, MTBF and Weibull analysis.
- Maintenance Methods and applications including RCM, TPM and CBM
- Application of Kano and QFD for capturing customer requirements
- Equipment Asset Management and ISO55000

Learning outcomes

By the end of the module, students should be able to:

- Develop a critical understanding of Quality Management theories
- Analyse lifetime data to measure reliability performance
- Evaluate how quality and reliability tools are applied to aid customer satisfaction
- Reflect on how the module enhances the product quality, reliability and maintenance of an engineering business, in the context of modern digital and data-driven organisational environments.
- Investigate the role of equipment asset management and maintenance in an engineering business

Indicative reading list

Specific reading list for the module

Subject specific skills

Knowledge, critique and practical application of quality management methods and quality tools, reliability tools, maintenance methods and concepts and use of equipment asset management.

Lifetime data analysis modelling and skills

Transferable skills

Verbal and written communication, presentation, teamwork, reflective practice, adaptability, leadership, terminology literacy. problem solving and analytical skills.

Study

Study time

Type	Required
Lectures	6 sessions of 1 hour (4%)
Seminars	24 sessions of 1 hour (16%)
Practical classes	(0%)
Online learning (scheduled sessions)	(0%)
Online learning (independent)	20 sessions of 1 hour (13%)
Private study	40 hours (27%)
Assessment	60 hours (40%)
Total	150 hours

Private study description

work on recorded lectures and exercises provided by tutor. Connect with key texts and literature in the subject to deepen learning.

Costs

No further costs have been identified for this module.

Assessment

You must pass all assessment components to pass the module.

Assessment group A4

Assessment component	Weighting	Study time	Eligible for self-certification

	Weighting	Study time	Eligible for self-certification
Essay and analysis	70%	42 hours	Yes (extension)

Create a QRM plan by critically reviewing key QRM tools and asset management within a specific context. Lifetime data analysis by fitting data to an appropriate distribution and interpreting the results with respect to the bath-tub curve and the context of the question.

Reassessment component

essay and analysis			No

Data analysis question followed by essay question focussing on student critical review of tools, techniques and methods covered in the module.

Assessment component

Quality Management Review	20%	12 hours	Yes (extension)

Following module sessions, students will create an individual review of Quality Management theories.

Reassessment component

Quality Management Review			No

Critical review of Quality Management theories.

Assessment component

Reflective diary	10%	6 hours	Yes (extension)

Reflection of the module learning developed throughout the module. Access to reflective blog is available on moodle for each week of the module. Students are encouraged to reflect weekly and compile and review for submission after the module.

Reassessment component

Reflective diary			No

Reflect on student learning development and growth through the module.

Feedback on assessment

Written feedback

Availability

Courses

This module is Core for:

- Year 1 of TWMS-H1S3 Postgraduate Taught Engineering Business Management (Full-time)