

ES969-10 Quality, Reliability and Maintenance

21/22

Department

WMG

Level

Taught Postgraduate Level

Module leader

Jane Marshall

Credit value

10

Module duration

1 week

Assessment

Multiple

Study location

University of Warwick main campus, Coventry

Description

Introductory description

To develop the skills and knowledge to be able to apply Quality, Reliability and Maintenance concepts, techniques and philosophies to:

- increases customer satisfaction
- reduces cycle time and costs
- eliminate errors and rework
- improve profitability and competitiveness

Module aims

To develop the skills and knowledge to be able to apply Quality, Reliability and Maintenance concepts, techniques and philosophies to:

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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 (in-module assignment)
- 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 and MTBF
- Maintenance Methods and applications
- Application of QFD
- Design for Six Sigma concepts

Learning outcomes

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

- Critique current and past Quality Management philosophies such as Deming, Six Sigma, European Foundation for Quality Management (EFQM), Total Quality Management (TQM) and ISO9000 Quality Management Standard.
- Discover how the application of reliability tools and testing including Fault Tree Analysis (FTA), Failure Modes and Effects Analysis (FMEA), Accelerated Life testing (ALT), Environmental Stress Screening (ESS) and Reliability Block Diagrams (RBD) improves product Quality and Reliability.
- Develop a conceptual understanding of maintenance philosophies including Reliability Centred Maintenance (RCM), Total Productive Maintenance (TPM) and Condition based Monitoring (CBM)
- Interpret how the effect of faults during the product life affect Quality and Reliability of a product and investigate the link to developing systematic maintenance strategies.
- Discover how the application of Quality tools such as Statistical Process Control (SPC) and root cause analysis can improve product and/or service quality
- Evaluate how tools such as Quality Function Deployment (QFD), FMEA and FTA are applied to design for quality, reliability and maintenance.

Indicative reading list

Dhillon, B. S. (2006). Maintainability, maintenance and reliability for engineers. Boca Raton: Springer/Taylor Francis. 9781420006780

Jardine, J. D. and Tsang, H. C.(2017). Maintenance, Replacement, and Reliability. Boca Raton: CRC press/Taylor Francis . 9781138072107

Moubray, J. (1997). Reliability Centred Maintenance. Oxford: Butterworth-Heinemann. 0750633581

O'Connor, P. D., & Kleyner, A. (2012). Practical Reliability Engineering. London: Wiley. 9781119961277

Pecht, M., & Kapur, M. J. (2014). Reliability Engineering. Hoboken: John Wiley. 9781118841686

Smith, D. (2011). Reliability, Maintainability and Risk. Amsterdam: Butterworth-Heinemann. 9780080969022

Deming, W. Edwards (2000). Out of the Crisis. Cambridge, Mass MIT Press. 0262541157, 9780262541152

Goetsch, David L., Davis, Stanley (2014). Quality management for organizational excellence: introduction to total quality. Harlow: Pearson. 1292022337. 9781292022338

Montgomery, Douglas C (2013). Introduction to Statistical Quality Control. John Wiley. 1118573595. 9781118573594

Franchetti Matthew J. 2015. Lean Six Sigma for engineers and managers: with applied case studies. Boca Raton: CRC Press Taylor & Francis Group. 1482243520, 9781482243529

Pyzdek Thomas, Keller Paul A. The Six Sigma handbook: a complete guide for green belts, black belts, and managers at all levels. New York: McGraw-Hill. 007162338,9780071623384

Ficalora, Joseph P., Cohen, Lou (2010). Quality function deployment and Six Sigma: a QFD handbook. Prentice-Hall. 0133364437, 0135138353,9780133364439, 9780135138359

[View reading list on Talis Aspire](#)

Subject specific skills

Knowledge, critique and practical application of quality management methods, knowledge, critique and application of quality tools, reliability tools and maintenance methods.

Transferable skills

Verbal and written communication, presentation, teamwork, reflective practice, adaptability, leadership, terminology literacy.

Study

Study time

| Type | Required |
|-------------------|-----------------------------|
| Lectures | 16 sessions of 1 hour (16%) |
| Practical classes | 15 sessions of 1 hour (15%) |
| Private study | 9 hours (9%) |
| Assessment | 60 hours (60%) |
| Total | 100 hours |

Private study description

3 hours self-directed pre-work

6 hours timetabled for mini-project group work

60 hours of self-study leading to Post Module Assignment

Costs

No further costs have been identified for this module.

Assessment

You do not need to pass all assessment components to pass the module.

Assessment group A1

| | Weighting | Study time |
|---|-----------|------------|
| Assessed work as specified by department | 100% | 60 hours |
| Words 4000 words plus in-module exercise assessment and reflective writing on module learning outcomes (70% + 20% + 10%) | | |

Assessment group R

| | Weighting | Study time |
|--|-----------|------------|
| Assessed work as specified by department | 100% | |
| 100% PMA | | |

Feedback on assessment

In class debrief of performance on in-module activity; written feedback will be provided in a report for all Post Module assignments.

Availability

Courses

This module is Core optional for:

- Year 1 of TESA-H7Q0 Postgraduate Taught Manufacturing Systems Engineering & Management
- Year 1 of TESS-H7Q1 Postgraduate Taught Manufacturing Systems Engineering & Management

- Year 1 of TESS-H7Q5 Postgraduate Taught Manufacturing Systems Engineering & Management (HKPU)

This module is Optional for:

- Year 1 of TESS-H1ZW Postgraduate Taught Programme and Project Management
- TESS-H7PT Postgraduate Taught Programme and Project Management (Hong Kong)
 - Year 1 of H7PT Programme and Project Management (Hong Kong)
 - Year 1 of H7PT Programme and Project Management (Hong Kong)

This module is Core option list C for:

- Year 1 of TWMS-H7BG Postgraduate Supply Chain and Logistics Management (awarded jointly with Hong Kong Polytechnic University)
- Year 1 of TESS-H7PE Postgraduate Taught Supply Chain and Logistics Management (Overseas and Self-Financing)

This module is Option list A for:

- Year 1 of TESS-H1PU Postgraduate Taught International Technology Management
- Year 1 of TESS-H6C4 Postgraduate Taught International Technology Management (Hong Kong)

This module is Option list B for:

- Year 1 of TESS-H1P2 Postgraduate Award in Engineering Business Management
- Year 1 of TESA-H1P7 Postgraduate Taught Engineering Business Management
- Year 1 of TESS-H1P1 Postgraduate Taught Engineering Business Management
- Year 1 of TESS-H1X6 Postgraduate Taught Programme and Project Management
- Year 1 of TWMS-H1Y9 Postgraduate Taught Service Management and Design (Hong Kong)

This module is Option list C for:

- Year 1 of TWMA-H1NB Postgraduate International Trade, Strategy and Operations
- Year 1 of TESA-H7PD Postgraduate Taught Supply Chain and Logistics Management (Home Fees)