

Catalogue of Modular Vocational Training Courses in Industrial Maintenance – TMC-VET

Achieved result of the SMTMC project

Designed by Tunisian universities in collaboration with European partners

Validated by industrial experts and academic stakeholders

Structured into three levels of qualification for VET learners

1. Introduction

This result presents the vocational training programme TMC-VET (Tunisian Maintenance Centre – Vocational Education and Training), designed under Work Package 3 of the SMTMC project. The programme is built on a modular structure aligned with the competence framework defined in WP1.3, addressing the evolving needs of the industrial maintenance sector.

Developed jointly by academic institutions and industrial stakeholders, TMC-VET aims to strengthen the practical and technical skills of technicians, engineers, and maintenance managers. It offers flexible learning pathways adapted to the level and professional goals of learners.

Each module in the catalogue includes clearly defined learning outcomes, detailed content structure, recommended teaching methods, and evaluation strategies. A selection of modules is also available on the SMTMC blended learning platform, TMC-KNOWLEDGE, supporting self-paced and remote learning.

2. Structure of the TMC-VET Programme

The TMC-VET programme is organised into three progressive levels, each targeting a specific profile of learners and professional functions within the field of industrial maintenance:

Level 1 – Technician Training

This level is designed for learners aiming to develop operational maintenance skills. It focuses on practical techniques, use of basic tools and instruments, and understanding standard maintenance procedures.

Level 2 – Engineer-Level Training

Aimed at learners preparing for or already engaged in supervisory roles. This level integrates diagnostic tools, advanced maintenance technologies, and basic management principles to prepare future team leaders.

Level 3 – Managerial and Strategic Maintenance

This level targets experienced professionals or engineers moving toward strategic positions. It addresses decision-making in maintenance, budgeting, reliability-centred maintenance, and integration of digital transformation tools.

Each training module is self-contained and can be delivered individually or as part of a broader certified programme. The structure allows for flexible learning routes, supporting both initial vocational education and lifelong learning.

3. Catalogue of Core Modules – TMC-VET Programme

The following 13 modules constitute the core of the TMC-VET training offer. Each module includes theoretical content, hands-on exercises, and competence-based evaluation tools.

1. Statistical Analysis Tools

Covers basic statistics, data interpretation, and reliability analysis for maintenance operations. Includes Excel and specialised tools for data-driven decision-making.

2. Maintenance of Mechanical Equipment

Focuses on installation, inspection, and preventive maintenance of rotating machines, gears, valves, and mechanical components in industrial settings.

3. Lubrication Course

Presents lubrication techniques, types of lubricants, selection criteria, and contamination control to extend equipment life and reduce breakdowns.

4. Vibration Measurement and Analysis

Introduces vibration principles, tools, and analysis techniques for condition-based monitoring and fault detection in rotating machinery.

5. Bearing Maintenance

Explores types of bearings, mounting/dismounting procedures, fault identification, and best practices for extended bearing life and reduced downtime.

6. Flexible Couplings for Power Transmission

Covers coupling types, selection criteria, installation, alignment, and fault diagnosis. Hands-on activities include coupling assembly and disassembly.

7. Maintenance of Electrical Equipment

Focuses on motors, generators, transformers, and control systems. Includes electrical testing tools and safety procedures.

8. Corrosion

Explains types and causes of corrosion, materials selection, protection methods, and monitoring strategies in industrial environments.

9. Water Treatment

Introduces principles of water chemistry, treatment methods for industrial systems, and preventive maintenance strategies for pipes, boilers, and cooling towers.

10. Piping and Pumps Maintenance

Details piping systems and pump types, installation and maintenance procedures, leak detection, and vibration monitoring techniques.

11. Root Cause Analysis

Provides tools and techniques to investigate maintenance failures using systematic approaches like the 5 Whys, Fishbone diagram, and Failure Mode Analysis.

12. Maintenance Economics

Covers budgeting, life cycle cost analysis, total productive maintenance (TPM), and cost-benefit decision-making in maintenance operations.

13. Requirements of Preventive Maintenance

Explores planning, scheduling, documentation, and performance indicators for implementing effective preventive maintenance programmes.

4. Conclusion

The TMC-VET modular training programme represents a concrete and transferable result of the SMTMC project. It responds directly to the industrial needs identified during the national skills analysis and provides a flexible and competence-based learning pathway for different categories of learners.

By covering key maintenance topics through clearly structured and industry-validated modules, TMC-VET contributes to the upskilling of technical staff and supports the modernisation of vocational education in Tunisia. The programme is also adaptable to other countries and institutions interested in improving their maintenance training offer in line with emerging technologies and operational excellence.

A selection of these modules is available in digital format via the TMC-KNOWLEDGE blended learning platform, facilitating self-paced training, remote access, and integration into company-based learning schemes.