



WE128: Desalination Maintenance Optimization

Training Description:

Desalination plants operate in highly demanding environments where equipment reliability, water quality, energy efficiency and operational continuity are critical. Poorly optimized maintenance practices can lead to frequent failures, increased operating costs, membrane fouling, unplanned shutdowns and reduced plant availability.

This **intensive Desalination Maintenance Optimization** training course is designed to equip maintenance engineers, plant operators and technical managers with **modern, data-driven, and best-practice maintenance strategies** for thermal and membrane-based desalination plants. The training course integrates **preventive, predictive and condition-based maintenance approaches** aligned with reliability-centered maintenance (RCM), asset management (ISO 55000) and digital maintenance systems.

Participants will gain in-depth knowledge of **critical equipment maintenance, membrane performance optimization, corrosion and fouling control, spare parts and lifecycle management, maintenance planning and energy-performance optimization**, with practical case studies from RO, MSF, MED, and hybrid desalination plants.

Training Objectives:

By the end of the training, participants will be able to:

- ✓ Implement optimized maintenance strategies for RO, MSF and MED desalination plants
- ✓ Reduce unplanned downtime through effective preventive and predictive maintenance
- ✓ Improve membrane life, heat exchanger performance and rotating equipment reliability
- ✓ Apply condition monitoring and diagnostics for early fault detection
- ✓ Optimize maintenance planning, scheduling and spare parts management
- ✓ Minimize fouling, scaling, corrosion and biofouling-related failures
- ✓ Enhance energy efficiency through proper equipment maintenance
- ✓ Integrate digital tools, CMMS and KPIs into maintenance decision-making

Training Designed for:

This training course is intended for Desalination Plant Maintenance Engineers, Mechanical, Electrical, and Instrumentation Engineers, Operations and Reliability Engineers, Asset Management and Maintenance Managers, Water Treatment Plant Supervisors, Utility Engineers and Technical Specialists, Process Engineers involved in plant optimization and O&M Contractors and Service Providers.

Training Requirement:

“Hand’s on practical sessions, equipment and software will be applied during the course if required and as per the client’s request.”

Contents can be adapted to your specific wishes. It is therefore possible to focus on specific modules of the training course as per client’s learning needs and objectives. Further, it should be forwarded to us a month prior to the course dates.

Training Program:

DAY ONE:

DESALINATION SYSTEMS OVERVIEW & MAINTENANCE STRATEGY DEVELOPMENT

- ❖ **Desalination Technologies Overview**
 - Seawater vs brackish water desalination
 - RO, MSF, MED, MVC and hybrid systems
 - Key components and critical failure points
- ❖ **Maintenance Challenges in Desalination Plants**
 - Harsh marine environment effects
 - High salinity, temperature and corrosion issues
 - Fouling, scaling, and biofouling impacts
- ❖ **Maintenance Philosophy & Best Practices**
 - Reactive vs preventive vs predictive maintenance
 - Reliability-Centered Maintenance (RCM)
 - Risk-based maintenance (RBM)
 - Asset criticality analysis
- ❖ **Maintenance Strategy Development**
 - Equipment criticality ranking
 - Failure mode and effects analysis (FMEA)
 - Maintenance task selection and optimization
 - Alignment with ISO 55000 asset management

DAY TWO:

MECHANICAL EQUIPMENT MAINTENANCE OPTIMIZATION

- ❖ **Pumps, Motors and Drives**
 - High-pressure pumps and booster pumps
 - Alignment, balancing, vibration issues
 - Bearings, seals and lubrication best practices
 - Variable Frequency Drives (VFD) maintenance
- ❖ **Valves and Piping Systems**
 - Valve types used in desalination plants
 - Actuator maintenance and calibration
 - Piping corrosion, erosion and leak prevention
- ❖ **Heat Exchangers & Thermal Equipment**
 - MSF and MED heat exchanger maintenance
 - Tube fouling, scaling, and cleaning techniques
 - Performance monitoring and degradation analysis
- ❖ **Rotating Equipment Reliability**
 - Root cause failure analysis (RCFA)
 - Condition-based maintenance techniques
 - Case studies from desalination plants

DAY THREE:

MEMBRANE SYSTEMS & WATER CHEMISTRY CONTROL

- ❖ **RO Membrane System Maintenance**

- Membrane structure and materials
- Common failure mechanisms
- Performance indicators (flux, salt rejection, pressure drop)
- ❖ **Membrane Fouling & Scaling Control**
 - Organic, inorganic, colloidal and biofouling
 - Pretreatment system maintenance
 - Chemical cleaning (CIP) optimization
- ❖ **Chemical Dosing & Pretreatment Systems**
 - Antiscalants, biocides, coagulants
 - Chemical storage and injection system maintenance
 - Safety and environmental considerations
- ❖ **Water Quality Monitoring & Diagnostics**
 - SDI, turbidity and TOC monitoring
 - Early fouling detection techniques
 - Data-driven performance trending

DAY FOUR:

ELECTRICAL, INSTRUMENTATION & DIGITAL MAINTENANCE

- ❖ **Electrical Systems Maintenance**
 - Power distribution systems
 - Motors, MCCs, transformers, and protection systems
 - Electrical safety and compliance
- ❖ **Instrumentation & Control Systems**
 - Flow, pressure, conductivity, and pH sensors
 - Calibration and accuracy management
 - Control valve and actuator diagnostics
- ❖ **Automation & Control Optimization**
 - SCADA and DCS maintenance practices
 - Alarm management and fault diagnostics
 - Cybersecurity considerations for control systems
- ❖ **Digital Maintenance & Analytics**
 - CMMS/EAM implementation and optimization
 - Maintenance KPIs and dashboards
 - Predictive maintenance using condition monitoring
 - Introduction to AI and digital twins in desalination

DAY FIVE:

MAINTENANCE PLANNING, ENERGY OPTIMIZATION & CONTINUOUS IMPROVEMENT

- ❖ **Maintenance Planning & Scheduling**
 - Work order management
 - Shutdown and turnaround planning
 - Contractor and vendor management
- ❖ **Spare Parts & Lifecycle Management**
 - Critical spares identification
 - Inventory optimization
 - Obsolescence management

- ❖ **Energy Efficiency & Performance Optimization**
 - Energy consumption drivers in desalination
 - Maintenance impact on specific energy consumption (SEC)
 - Energy recovery devices (ERD) maintenance
- ❖ **Performance Benchmarking & Continuous Improvement**
 - Maintenance KPIs and performance benchmarking
 - Lessons learned and best practices
 - Action plan development for participants' plants
- ❖ **Workshop & Case Studies**
 - Real-life maintenance optimization scenarios
 - Group discussions and solution development
- ❖ Course Conclusion
- ❖ POST-ASSESSMENT and EVALUATION

Training Methodology:

This interactive training course includes the following training methodologies as a percentage of the total tuition hours:

- 30% Lectures, Concepts, Role Play
- 70% Workshops & Work Presentations, Techniques, Based on Case Studies & Practical Exercises, Gamification, Software & General Discussions
- Pre and Post Test

Training Certificate(s):

CMCT Internationally recognized certificate(s) will be issued to each participant who completed the course.

Training Fees:

USD\$ TBA - This rate includes participant's manual, hand-outs, buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

Note: The 5% VAT (Value Added Tax), will be effective starting 01st of January 2018 as per the new regulation from the UAE Government. The VAT applies for all quotation both for local and abroad.

Training Timings:

Daily Timings:

07:45 - 08:00	Morning Coffee / Tea
08:00 - 10:00	First Session
10:00 - 10:20	Recess (Coffee/Tea/Snacks)
10:20 - 12:20	Second Session
12:20 - 13:00	Recess (Prayer Break & Lunch)
13:00 - 14:00	Last Session

For training registrations or in-house enquiries, please contact:

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