



# WE122: Advanced RO Operational Training

## Training Description & Objectives:

After successful completion of the course participants will have an excellent and advanced knowledge RO plant O & M, troubleshooting, design and components' selection, chemical cleaning and RO economics.

**By the end of the training, participants will gain valuable know-how related to reverse osmosis plants on:**

- ✓ Membrane types, application and configurations
- ✓ Understand Osmosis & Reverse Osmosis principles
- ✓ RO Plant Configuration and passes
- ✓ How to operate smoothly RO plant
- ✓ Monitor RO plant performance and take necessary corrective action
- ✓ Control scaling, fouling and chemical attack by using appropriate pretreatment technologies
- ✓ Reverse Osmosis membranes cleaning
- ✓ Understand RO design
- ✓ RO components selection
- ✓ RO economics
- ✓ RO Maintenance Management
- ✓ RO performance parameters monitoring and control
- ✓ RO process normalization

## 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 Designed for:

This course is intended for Plant & technical support managers, O & M supervisors, senior mechanical and electrical engineers, senior chemists, environmental and consulting engineers for reverse osmosis plants.

## Training Program:

### FIVE DAYS:

- ❖ **Part I: Membrane Modules Configuration:**
  - Difference between Cross flow & Depth Flow
  - Microfiltration, Ultra-filtration, RO
  - Membranes Materials & Structure
- ❖ **Part II: RO System Configuration and Design Parameters**
  - Parameters Affecting Membrane Performance
  - Pretreatment System Components
  - ROMAS (Reverse Osmosis Membrane Assembly)
  - Post Treatment System
  - Orientation to R.O Plant system

- Instrumentation
- Flush/ Cleaning System
- Feed Water Specs
- Alarms and Protections
- ❖ **Part III: Reverse Osmosis System Operation and Maintenance**
  - RO System Startup and Operation
  - Daily Operation Instructions
  - Chemicals doses calculation and preparation
  - Back Wash Process
  - Cartridge Filters Replacement
  - Membrane Flow & Probe Test
  - Membrane replacement
  - SDI Test
- ❖ **Part IV: RO Engineering Design Process**
  - Computer Projections of RO System Performance
  - Acceptance Test and Monitoring System
  - Select the Flow Configuration and Number of Passes
  - Calculate the Number of Elements & Number of Stages
  - Performance Normalization
  - Introduction to Piping System
    - Pipe types
    - Pipes schedule, pressure ratings, materials, etc.
- ❖ **Part V: Corrosion Introduction**
  - Corrosion definition
  - Corrosion types and control
  - Introduction to stainless steel material types and grades
- ❖ **Part VI: Technical**
  - Units conversion
  - Net Driving Pressure NDP
  - HPP & ERT Efficiency calculations
  - Recovery calculations
  - Pumping Systems
    - Design of pumps and motors
    - Pump construction
    - Types of pumps
    - Pump selection "dosing, feed, etc."
  - Mechanical shaft seal
    - The mechanical shaft advantages
    - Types of mechanical shaft seals
  - Electric Motors
    - Some Basic Motor Concepts
    - Operating Principles
    - Stator
    - Rotor

- Proper installation of flow meters
- ❖ **Part VII: Maintenance**
  - Types of maintenance
    - PM
    - CM
  - Maintenance & repair of:
    - High pressure pump & motor
    - ERT
    - MMFs & CF
    - Pressure vessels
    - Membranes
    - Feed/ sea water intake / flushing pumps
  - ERT inspection, maintenance, repair
  - Pump /motors
  - Equipments Lubrication
  - PVC repair & installation
- ❖ **Part VIII: Administrative**
  - How to maintain a proper & accurate daily log report?
  - Housekeeping
- ❖ **Part IX: Safety**
  - Hazards & Fire Fighting
  - Safety of:
    - Pressure vessels
    - HPP
    - Electric motor
    - ERT
- ❖ **Part X: Troubleshooting Spiral Wound RO & NF Systems**
  - Importance of record keeping
  - General rule of troubleshooting
  - Signs of trouble
  - Causes and corrective measures
  - Taking the total system approach
- ❖ **Part XI: Cleaning RO and NF Membrane Elements**
  - When to Clean
  - Defining a Foulant and Scalant
  - pH and Temperature Limits
  - FT30 Resistance to Cleaning Agents
  - Cleaning Carbonate Scaling
  - Cleaning Sulfate Scaling
  - Cleaning Organic Fouling
  - Cleaning Biological Fouling
  - Cleaning Iron Fouling
  - Cleaning Silt Fouling
  - Cleaning Carbon Fouling

- Chemical Attack
- Permeate Back Pressure
- The Cleaning Process
- Safety
- Questions & Answers
- ❖ 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:

**TBA as per the course location** - 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 01<sup>st</sup> 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:**

**Aisha Relativo** - Training & Career Development Manager

[aisha@cmc-me.com](mailto:aisha@cmc-me.com) / [training@cmc-me.com](mailto:training@cmc-me.com)

Tel.: +971 2 665 3945 or +971 2 643 6653 | Mob.: +971 52 2954615