Training Workshops

Water Treatment Plant Design
6-8 December 2011, Flora Grand Hotel, Dubai, UAE

RO Plant - Design & Troubleshooting
11-13 December 2011, Flora Grand Hotel, Dubai, UAE

Water Treatment Plant Design
6-8 December 2011, Flora Grand Hotel, Dubai

This training workshop is aimed at engineers and technical staff from water treatment companies (OEMs), water treatment component manufacturing companies, consultants to design water treatment plants for their customer needs. This workshop is intensive with exercises and practice work in designing water treatment plants.

Program Outline

1. Water Treatment Fundamentals
   - Water Chemistry & Characteristics
   - Typical Water Treatment Plant Block Diagrams
   - Sizing Calculations of Conventional Water Pre-Treatment Unit Processes
     - Coagulation & Flocculation
     - Settling / Clarification
     - Filtration
     - Disinfection - UV, Chlorination
     - De-chlorination
   - Sizing calculations of Ion Exchange
     - Softening
     - Two Bed Demineralization
   - Sizing calculations of Membrane Processes
     - UF Membrane System (Pressurized)
     - RO Membrane System - Manual and Computer-based
   - Sizing Calculations of Chemical Dosing Equipment

2. Engineering of Water Treatment Plants
   - Piping & Valves Selection and Sizing
   - Pump selection
   - Instrumentation Requirement & Selection

3. Design Workshops
   - Ion Exchange Demineralization Plant
   - Membrane based surface water treatment Plant: UF - RO

[Signature]
26.4.2012
4. Group Exercises
- Drinking Water Plant: Conventional
- Process Water Plant: UF - RO – DM

Remark: All the participants who register this workshop must bring their laptop notebook and engineering calculator.

Program Agenda: 9 am to 5 pm (each day)  
Program Language: ENGLISH

RO Plant – Design & Troubleshooting
11-13 December 2011, Flora Grand Hotel, Dubai, UAE

This training workshop is aimed at reverse osmosis (RO) system design, troubleshooting and monitoring. This workshop is useful for the water treatment companies (OEMs) and user industries. Design, Proposal, Field engineers; Project and Field/Technical Service managers and operators will be benefited from this program.

Program Outline

Reverse Osmosis (RO) Fundamentals
- What is osmosis & reverse osmosis?
- What is the role of RO membranes?
- What are the fundamental requirements of RO process and factors affecting performance?
- Comparison between RO, UF, NF, MF

Membranes
- Classification of membranes (Materials, Structure, Shape, Module)
- Membranes Ratings
- Typical element specification sheet
- Effect of time & temperature on membrane performance
- Spiral wound module construction demonstration (Explain leaf construction, permeate and feed spacers, brine seal)
- Membranes of different sizes

RO Process Operating Parameters
- Recovery
- Salt Passage, Salt Rejection
- Concentration factor & its effects
- Effect of temperature & recovery on performance
- Pressure drop
- Average feed pressure

RO System Construction
- Arrays (limiting flows)
- Reject staging (multi-stage system)
- Permeate staging (multi-pass system)
- Partial second pass
- Split partial
- Hybrid membrane system
- RO system design optimization using computer projections

RO Process – Performance
- TDS, Pressure, Flow variation in pressure vessels
- pH & LSI variation across membranes

RO Process Design Parameters
- Flux
- Net driving pressure
- Log mean average feed concentration
- Osmotic pressure
- Temperature
- Salt Passage correction Factor
- Flux decline per year
- Beta Factor
- Manual & computer calculations of RO projections

RO Pretreatment
- Feed water limiting conditions (pH, temperature, turbidity, silt density index, organics, micro-biological matter, oil & grease, oxidising agents, solvents and heavy metals)
- Conventional pretreatment
- Membrane pretreatment
- Monitoring pretreatment performance

Scaling
- Scaling (CaCO₃, Ca₃(PO₄)₂, CaSO₄, BaSO₄, SrSO₄, CaF₂)
- Scaling potentials – LSI, SDSI, % saturation
- Silica scaling – effect of pH
- Identifying scaling condition
- Cleaning solutions
- Case study

Fouling
- Fouling (iron, microbiological, colloidal, particulate, organic, oil)
- Fouling potentials
- Identifying fouling condition
- Case study
Membrane Damage
- Physical damage
- Chemical damage
- Identifying membrane damage condition
- Case study

Membrane Cleaning
- Cleaning system requirements
- Cleaning solutions
- Cleaning procedure
- Performance evaluation

RO Process – Data Normalization
- Objective
- Principles
- Procedure, Results
- Software use
- Evaluation and Decisions

Investigation Techniques
- Data collection & record keeping
- Vessel profiling
- Probing technique
- Element examination procedure
- Testing of returned element
- Membrane autopsy

RO Process – Troubleshooting
- Troubleshooting steps
- Increased normalized salt passage
- Reduced normalized permeate flow
- Increased normalized pressure drop
- Increased normalized permeate flow
- Corrective actions
- Preventive actions
- Case studies

Group Exercises/Workshop
- RO Plant Design
- RO Plant Troubleshooting

Remark: All the participants who register this workshop must bring their laptop notebook and engineering calculator.

Program Agenda: 9 am to 5 pm (each day)  
Program Language: ENGLISH

Program Instructor – Satish Chilekar

Mr. Satish Chilekar, Water Management Advisor, will deliver the courses. Recognized as a pioneer in the Indian membrane technology sector, Mr. Chilekar provides technical expertise to industries and utilities in applications of membrane technology. This includes reverse osmosis, nanofiltration, ultrafiltration, microfiltration and MBR membrane technologies applied for sea water desalination, potable water treatment, and industrial and municipal wastewater reclamation. Mr. Chilekar is currently active in research, consultancy and training work in India and SE Asia. Training is an important part of Mr. Chilekar’s work. He conducts regular training courses in India and overseas on various aspects of Membrane Technology and Water Treatment. He is a regular contributor to water technology journals.

Organizer Profile – Water Treatment Academy

Water Treatment Academy is a division at TechnoBiz Communications Co., Ltd., based in Bangkok, Thailand. This academy is educational and knowledge-based platform for water treatment and wastewater treatment operators and designers. It offers specialized technical training programs and conferences on water and wastewater. Please visit website www.watertreatment-academy.org for the list of events. This academy also publishes reference books. It has published books: Seawater Pretreatment; Desalination Plant Concentrate Management, Desalination Cost Assessment and Management and UF/MF Membrane Water Treatment. Many other books are in the process.

Upcoming Events by Water Treatment Academy
- Seawater Desalination (24-27 October 2011, Barcelona, Spain / 9-12 April 2012, Florida, USA)

For more information, please contact

Water Treatment Academy, TechnoBiz Communications Co., Ltd.
2521/27, Lardprao Road, Klongchaokhunsingha, Wangthonglang, Bangkok 10310 Thailand
Tel: 66-2-933 0077 Fax: 66-2-538 1325 Cellphone: 66-81-988 6874
Email: training@watertreatment-academy.org Web: www.watertreatment-academy.org
Registration Form – Water Treatment Training Workshops

We confirm to register

<table>
<thead>
<tr>
<th>Program</th>
<th>Date</th>
<th>Registration Fee Before 20 Oct ‘11</th>
<th>Person, € After 20 Oct ‘11</th>
</tr>
</thead>
<tbody>
<tr>
<td>☐ Water Treatment Plant Design</td>
<td>6-8 Dec 2011, Dubai</td>
<td>1,400 €</td>
<td>1,600 €</td>
</tr>
<tr>
<td>☐ RO System Design &amp; Troubleshooting</td>
<td>11-13 Dec 2011, Dubai</td>
<td>1,400 €</td>
<td>1,600 €</td>
</tr>
<tr>
<td>☐ Both Programs</td>
<td>6-8 &amp; 11-13 Dec 2011</td>
<td>2,650 €</td>
<td>3,000 €</td>
</tr>
</tbody>
</table>

Company Name ..................................................................................................................

Address ..................................................................................................................................

Tel ........................................................................................................................ Email ...........................................

Fax ........................................................................................................................ Email ...........................................

Contact Person .................................................................................................................

Tel ........................................................................................................................ Email ...........................................

Participant Names

Participant Name 1 ........................................ Position ........................................ Email ...........................................

Participant Name 2 ........................................ Position ........................................ Email ...........................................

Participant Name 3 ........................................ Position ........................................ Email ...........................................

Participant Name 4 ........................................ Position ........................................ Email ...........................................

Participant Name 5 ........................................ Position ........................................ Email ...........................................

Participant Name 6 ........................................ Position ........................................ Email ...........................................

Remarks: Payment is required with registration. Registration Fee includes training documentation, lunch & refreshments during the workshop. Group Registration: If 3 or more than 3 delegates register from the same company, 10% discount will be offered on the registration fee.

Do you need Hotel Accommodation Assistance at Flora Grand Hotel? ☐ Yes ☐ No
(Flora Grand Hotel Accommodation Rate: AED 500 / night which includes breakfast, 20% taxes, free internet in the room)

Payment Method:

☐ Bank Transfer to Bangkok Bank, A/C No: 177-0-70727-9, A/C Name: TechnoBiz Communications Co., Ltd., Ratchada-Latphrao Road branch, Bangkok (Swift Code: BKKBTHBK) (Kindly make payment for all bank charges)

☐ Credit Card ☐ Visa ☐ Master (5% bank fee applies for credit card processing)

Card Number ................................................ Cardholder Name .......................................

Card Expiry Date ........................................... Last 3 digits on Signature Panel ..........................

Signature of Cardholder ................................ Date ..........................................................

Please send registration form to

Water Treatment Academy, TechnoBiz Communications Co., Ltd.
2521/27, Lardprao Road, Klongchaokhunsingha, Wangthonglang, Bangkok 10310 Thailand
Tel: +66-2-933 0077 Fax: +66-2-538 1325 Mobile: +66-81-988 6874
Email: training@watertreatment-academy.org Web: www.watertreatment-academy.org
Contact Person: Khun Siritip, Program Coordinator B