

SGD 3379 for
2
Participants
or More

WATER CHEMISTRY FOR LARGE UTILITIES BOILERS FOR **CHEMIST & BOILER ENGINEERS**

23 – 24 SEPTEMBER 2019, KUALA LUMPUR, MALAYSIA

TOPICS COVERED

Steam Turbine and Steam Path
Chemistry and Failure Mechanisms

Boiler / Heat Recovery Steam
Generator (HRSG) Chemistry and
Failure Mechanisms

Feedwater Cycle Chemistry Treatments
and their Effective Management

Boiler and HRSG Evaporator
Treatments and their Effective
Management

Alternative Cycle Chemistry Treatments
and their Management

Effective Strategic Cycle Chemistry
Management

Expert Course Faculty Leader

Our expert course faculty is the Director of European Operations of a leading engineering and inspection consultancy in the power generation sector. His areas of specialization are instrumentation and controls (I&C) as well as materials science.

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About This Training Course

This is an advanced cycle chemistry training course for power plant chemists and chemical engineers wishing to expand their knowledge and skills and to become more effective in their day to day roles dealing with thermal power plant chemistry.

The course will provide ample opportunity for robust technical discussion and expand on advanced concepts in thermal power plant cycle chemistry. Due to being only a two day course, the course does not cover water treatment plants, cooling water chemistry and sampling and analysis systems. It focuses only on the steam/water aspects of the thermal power cycle.

After registration a plant survey form will be issued to each attendee to allow customization of the course material.

Course Learning Outcome

At the completion of this course the attendees should have a significantly increased understanding of cycle chemistry in a thermal power plant and the interrelationships between plant operation, cycle chemistry and potential failure modes due to corrosion and/or deposition throughout the cycle.

Attendees will be better equipped to effectively manage the corrosion and deposition risks in a thermal power plant

Who Should Attend

The course has been designed for attendees that have 1-5 years of experience in a thermal power station cycle chemistry and that have a basic understanding of the form and function of a thermal power station.

A basic background level of power plant chemistry knowledge is assumed for all the attendees including the ability to read and understand engineering drawings. The course is not suitable for persons without any power plant chemistry or power plant chemical engineering background.

After registration pre-course required technical reading will be issued to the attendees.

Unique Features with *powerEDGE* Training

- Pre-Course Questionnaire to help us focus on your learning objectives
- Detailed Course & Reference Manual for Continuous Learning and Sharing
- Practical Exercises & Case Examples to better understand the principles
- Limited class size to ensure One-to-One Interactivity
- Assessment at the end of the course to help you develop a Personal Action Plan

This training course has a limited attendance for up to 20 participants only.

Sessions commence at 9am on all days, with short intervals at 10.30am and 3.30pm respectively.

Refreshments will be provided in the short intervals.

Lunch will be provided at 12:30pm for 1 hour. Sessions will end at 5pm on all days.

2 Day Course Outline

Corrosion and Deposition Damage Mechanisms in the Steam / Water Cycle

- **Steam Turbine and Steam Path**
 - Chemistry of the Phase Transition Zone
 - Volatility of Impurities
 - Corrosion processes
- **Boiler / Heat Recovery Steam Generator (HRSG)**
 - Deposition and corrosion
 - Underdeposit corrosion
 - Carryover
- **Condensate System, Feedwater heaters and Deaerators**
 - Single and two phase flow-accelerated corrosion
 - Copper alloy corrosion
- **Condensers**
 - Condenser tube failures, Air Cooled Condenser failures
- **Corrosion Product Sampling**
 - Effective total iron and total copper sampling and analysis

Full day training module; covers the details of corrosion / deposition damage mechanisms in the major components of the steam / water cycle. The module describes the damage mechanism, the chemistry processes involved and the steps chemistry and plant staff can take to monitor and control. The module takes a detailed look at the various impurities and chemicals found in the steam / water cycle and discusses how each interacts throughout the cycle.

The module is designed to provide chemists and chemical engineers with a detailed understanding of damage mechanisms so that plant chemistry data and results can be used as predictive maintenance tool for planning inspections and repair work.

Key concepts include how each of the following can impact on damage mechanisms:

- At-temperature pH
- Early condensate chemistry
- Two phase conditions under steam formation
- Chemistry within porous deposits
- Oxides formed

Effective corrosion product sampling and analysis will also be reviewed and discussed in detail.

Advanced Steam / Water Cycle Treatments

- **Feedwater Treatments**
 - All-volatile treatment (reducing) treatment
 - All-volatile treatment (oxidizing) treatment
 - Oxygenated treatment
- **Boiler / Evaporator Treatments**
 - Phosphate Treatment
 - Caustic Treatment
 - All-volatile Treatment
- **Alternative Treatments**
 - Use of neutralizing amines
 - Use of filming amines
- **Cycle Chemistry Program Selection**
 - Optimization of current programs
 - Selection of alternative programs

Full day training module; covers the details of treatment selection, control and optimization. Each treatment is discussed in detail whilst highlighting advantages and disadvantages throughout the cycle in terms of corrosion and deposition control. The impact of different plant configurations (e.g. HRSG configuration, presence of air cooled condenser, presence of condensate polisher, etc.) on the selection of an ideal treatment is discussed. Techniques for monitoring and optimizing each treatment are examined.

This module will provide chemists and chemical engineers with a detailed understanding of the available cycle chemistry treatments so that they can optimize their treatment program to eliminate or minimize chemistry related damage mechanisms.

Key concepts include how each of the following are modified by each treatment:

- At-temperature pH
- Early condensate chemistry
- Two phase conditions under steam formation
- Chemistry within porous deposits
- Oxides formed

This module relates back to the Deposition Damage Mechanisms in the Steam / Water Cycle modules and should be taken only after completion of this module.

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Advanced Power Plant Chemistry Monitoring, Control and Management

- **Inter-relationship of Chemistry Monitoring Parameters**
 - pH / Specific Conductivity relationships
 - Contaminant / cation conductivity relationships
 - Predicting O₂ and CO₂ absorption
- **Inter-relationship of Chemistry Parameters around the Cycle**
 - Steam / Boiler / HRSG / Feedwater / Condensate / Makeup water parameter relationships
- **Diagnosing and Troubleshooting Cycle Chemistry Issues**
 - Trends and Validation Techniques
- **Effective Cycle Chemistry Strategic Management**
 - Routine, troubleshooting and strategic chemistry

Full day module; covers how the chemistry monitoring parameters across the power plant are inter-related to provide a basis for diagnosing and troubleshooting upset conditions. Each of the critical monitoring parameters throughout the power plant cycle are examined and their relationship to other parameters throughout the cycle are explained.

This module will provide chemists and chemical engineers with a detailed understanding of how chemistry parameters in the cycle react to each other and other plant operating conditions to allow the development of advanced plant specific troubleshooting guides and procedures to avoid corrosion and deposition issues.

Tools and techniques for effective cycle chemistry management will also be outlined and discussed with specific focus on the three key aspects of cycle chemistry management – routine, troubleshooting and strategic cycle chemistry

This module relates back to the Steam / Water Cycle Treatments and Corrosion and Deposition Damage Mechanisms in the Steam / Water Cycle modules and should be taken only after completion of these modules.

About Our Expert Course Trainer

He is currently the Director of European Operations of a leading engineering and inspection consultancy in the power generation sector. Activities are now concentrated on the steam cycle in combined cycle plants, but included projects for coal, oil, diesel and nuclear plants in the past. Areas of specialization are instrumentation and controls (I&C) as well as materials science.

CRE S.A., Sophia Antipolis, France (1987-1991)

Lead Engineer, worked on the design and development of real-time systems for controlling diesel generators and turbines. One application involved the development of a complete monitoring system under subcontract to a major European diesel manufacturer, which was subsequently installed on a new black start diesel at a US nuclear plant.

Raytheon Company, Development Laboratory, Sudbury, MA. USA (1983-1987)

Engineering and analyses to improve resistance of defense electronic systems to spatial environments and effects of nuclear radiation. This involved designing custom test circuitry and carrying out the tests at both Raytheon and US government facilities.

Combustion Engineering Inc., Nuclear Division, Windsor CT. USA (1980-1982)

Worked in the design group responsible for the nuclear fuel reloading (enriched uranium) for the St Lucie 1 and BG&E Calvert Cliffs plants. Used radiation transport programs for simulating the physics of the reactor during a cycle.

Recent Project Experience

- HRSG Inspections (more than 50 in last six years)
- Computer Simulation of Boiler and Steam Plant Performance
- API/ASME FFS-1 Fitness for Service Analysis on HRSG Components
- Coal Boiler Inspection and Life Assessments
- HRSG and Radiant Boiler Failure Analyses
- HRSG Training (annual public courses and closed session at client sites)

Patents:

US Patent 5,044,992, Sept 3, 1991, "Printed circuit injection molded connector with removable bifurcated contacts capable of high temperature exposure" (assigned to Raytheon Co.)

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	PER PARTICIPANT	2 PARTICIPANTS OR MORE	IN-HOUSE TRAINING
2 Day Programme	SGD 3,579 Per Participant	SGD 3,379 Per Participant	Guaranteed Minimum 40% Off Normal Price

4 ways to Register

 [Online Web Registration](#)
 info@poweredgeasia.com
 (65) 6741 9927
 (65) 6579 1288

ATTENDEE DETAILS

Name Job title

Tel Department Email

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ON SITE TRAINING

Can't make it for the Course?
We'll make the course come to you!!

Simply let us know your preferred time and dates and we will meet you at your schedule and venue.

With a host of highly trained experts, we will be happy to customize your programme with your needs 100% fulfilled.

Contact us today at

 info@poweredgeasia.com
 (65) 6741 9927

COMPANY DETAILS

Organisation name Industry.....

Address

Postcode..... Country.....

Tel Fax.....

PAYMENT METHODS

By Cheque/ Bank Draft: Make Payable to PowerEdge Pte Ltd.
 By Telegraphic Transfer: Please quote AE1 with the remittance advise
 Account Name: PowerEdge Pte. Ltd.
 Bank Code: 7339 Branch code: 686 Account Number: 686-253386-001 Swift Code: OCBCSGSG
 Bank Address: 65 Chulia Street OCBC Centre, Singapore 049513
 All bank charges and any local applicable taxes to be borne by payer. Please ensure that PowerEdge Pte Ltd receive the full invoiced amount.

PAYMENT POLICY

Payment is due in full at the time of registration. Full payment is mandatory for event attendance. I agree to PowerEdge Pte Ltd. payment terms
 * GST- Exclusive price is only applicable for overseas corporate customers subject to qualifying conditions.

CANCELLATIONS & SUBSTITUTIONS

You may substitute delegates at any time. POWEREDGE PTE LTD does not provide refunds for cancellations. For cancellations received in writing more than seven (7) days prior to the training course you will receive a 100% credit to be used at another POWEREDGE PTE LTD training course for up to one year from the date of issuance. For cancellations received seven (7) days or less prior to an event (including day 7), no credits will be issued. In the event that POWEREDGE PTE LTD cancels an event, delegate payments at the date of cancellation will be credited to a future POWEREDGE PTE LTD event. This credit will be available for up to one year from the date of issuance. In the event that POWEREDGE PTE LTD postpones an event, delegate payments at the postponement date will be credited towards the rescheduled date. If the delegate is unable to attend the rescheduled event, the delegate will receive a 100% credit

