

POWER PLANT CHEMISTRY For **CHEMIST & CHEMICAL ENGINEERS**

REGISTER 3 and
get 1 seat **Free!**
Valid Till
30 Apr 2014

16 – 18 JUNE 2014, KUALA LUMPUR, MALAYSIA



Expert Course Faculty Leader

DAVID ADDISON

BSc(Chemistry), MSc(Materials Science)

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

Inter-relationship of Chemistry
Monitoring Parameters

Inter-relationship of Chemistry
Parameters around the Cycle

Diagnosing and Troubleshooting Cycle
Chemistry Issues

Technical Question and Answer Sessions
Chemistry Issues



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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 three 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

Learning Outcomes

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.



3 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.

3 Day Course Outline

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.

Your Expert Course Faculty

David Addison (MSc) is the principal Power Plant Chemistry consultant of Thermal Chemistry Limited (New Zealand) where he works with utility organizations worldwide helping to resolve water/steam cycle chemistry, flow-accelerated corrosion, cooling water, water treatment plant and other water/steam related issues for thermal, co-generation and geothermal power plants. These activities are carried out with a clear focus on addressing the root cause of the problems being experienced and ensuring long term resolutions are in place.

Prior to starting up Thermal Chemistry Limited in April 2008, David has worked in the power industry since 1997 and was employed at the largest power station in New Zealand, the Huntly Power Station as a senior project chemist, where he was involved in all aspects of power station chemistry for both conventional (coal and gas) and combined cycle gas turbine units with a heavy involvement with major cycle chemistry changes (AVT[o] to OT), chemical cleaning, and the specification, design review, construction, commissioning and early operation of combined cycle gas turbine units.

David has presented and chaired sessions at numerous international cycle chemistry conferences and user groups meetings worldwide and has had multiple papers and articles published in scientific and industry journals on cycle chemistry in conventional units, cycle chemistry & chemistry commissioning issues in combined cycle gas turbine units, cycle chemistry management for combined cycle units, condensate polishing, and geothermal power plant chemistry.

David has been a contributing author to a book on combined cycle gas turbine plants, a senior author for the latest Electrical Power Research Institute (EPRI) cycle chemistry guidelines for combined cycle power plants, and the lead coordinating author for the soon to be published International Association for the Properties of Water and Steam (IAPWS) Technical Guidance Document (TGD) for corrosion product sampling and analysis in thermal power plants.

David is a member of the Power Cycle Chemistry (PCC) group of the International Association for the Properties of Water and Steam (IAWPS) and is involved in the development of international cycle chemistry guidelines.

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We have more than 200 programmes that we are capable of running. All we need is for you to contact us and request for the preferred programme and we will be able to develop it.

2. Where is PowerEdge based?

PowerEDGE is headquartered in Singapore but we run our training programmes in different venues around Asia.

3. What does PowerEdge do?

We are a Power & Utilities Training Specialist.

4. Can this course be done in our city?

It absolutely can. Get in touch with us to request for a training programme to be carried out in your city.

5. Can you reduce the price of our preferred course?

While our price has been reduced before it is even launched, we are always happy to help you with further discounts.

6. Can you change the dates of the course?

If you have a special requested date, let us know and we will arrange another session for you.

7. Who are the companies that will be participating?

This varies from a diversity of Power Operators, Regulators, Financiers, to Vendors in the Power & Utilities industry.

8. Where is the venue for the course?

We usually engage a 4 to 5 star hotel meeting room to ensure the comfort of our participants.

9. How many delegates should we expect for each course?

This varies from 15 to 20 participants. Class sizes are kept small to allow trainers to focus better on each participant.

10. What are the different payment modes?

We accept Visa/MasterCard, cheques, bank transfers and cash on site.

11. Is accommodation included when I sign up for a course?

Accommodation is not included in the course fee but we are always happy to advise on available accommodations.

12. Can I get a cheaper accommodation through PowerEdge?

We will be pleased to help you negotiate a better rate with hotels.

13. Is lunch provided during the course?

We provide lunch and 2 tea breaks every day during our training programmes.

14. Are the training materials included once I have signed up for a course?

Yes, training and course materials are included in the course fee.

15. Will there be a certificate for the course?

Yes, there will be a certificate of participation upon completion of a course.

16. Who are PowerEdge trainers?

They are expert consultants and practitioners with many years of experience in the subject matter that they deliver on.

17. Are PowerEdge trainers competent?

We have received numerous favourable feedbacks on our trainers from past participants.

18. Can PowerEdge assist with Visa travel applications?

We can assist in advising you on the relevant procedure(s) and embassies/consulates that provide Visa for travel purposes.

19. Can we purchase training materials without attending a course?

Unfortunately this option is not available as training materials are specially developed for courses.

20. Can course content be tweaked to cater to our needs?

Of course! Just let us know your request and we will get the trainer to assist in carrying it out.

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REGISTRATION FORM

	NORMAL PRICE	Early Bird SAVE SGD 200 Ends 30 Apr 2014	GROUP OF 3 or More
3 Day Programme	SGD 4,500 Per Participant	SGD 4,300 Per Participant	SGD 3,600 Per Participant

ATTENDEE DETAILS

Name Job title

Tel Department Email

Name Job title

Tel Department Email

Name Job title

Tel Department Email

Name Job title

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Name Job title

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COMPANY DETAILS

Organisation name Industry.....

Address

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

Tel Fax.....

PAYMENT METHOD:

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 payment in Singapore dollars (SGD) 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

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

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