

Water Cycle Chemistry, Corrosion, Failure Analysis & Remedy Measures on Steam Generator Systems



Introduction

Senior Engineer, Consultant, Lecturer and Author **Mr. Ludwig Hoehenberger** from the prestigious TÜV SÜD Industry Services, Munich, Germany. He is a Senior Expert with over 40 years of experience in Water Chemistry, Corrosion Failure Analysis and Materials Investigation.

Trainer's Background

Mr. Ludwig Höehenberger is a Senior Engineer at TÜV institute of material Testing (Material investigation, failure analysis, water chemistry and corrosion) of TÜV Süddeutschland Group, Munich Germany.

He has a strong professional experience of over 40 years serving in the field of failure analysis, water treatment, boiler, water chemistry and corrosion studies in fossil fired and nuclear power plants and many other different industrial plants in Europe and Asia.

In the past, he has also given presentation, lectures and lesson to boiler operators, consultants, technical engineers and official agencies as well as written articles in many publications and books such as:

- Handbook "Boiler Operation Technique" (1980/ 83/ 91/ 93/ 96/ 99) part of water chemistry, corrosion and analytical field investigation.
- A presentation to insurance on "Treatment and conditioning of portable water to avoid corrosion and scaling of supplying systems."
- Chemical cleaning of steam boiler-practice and risks.
- Failure on steam generators due to problems on water treatment and conditioning as well as due to design and operation faults.

Course Objectives

This course provides participants with the knowledge necessary to:

- Understand corrosion mechanisms and how to prevent material or components from corrosion
 - ⇒ Design, manufacturing, erection, commissioning
 - ⇒ Material selection including surface treatment (e.g. coating)
 - ⇒ Effects of the environment (media in contact)
 - ⇒ Effects of operational conditions including maintenance
- Differentiate the various Boiler types, Boiler Feedwater, Boiler Water and Steam Requirements
- Understand the principles of Water Treatment and Chemical Operation Mode adapted to Boiler Design and Operation Conditions
- Investigate the Failure Analysis and Remedy Measures on Steam Generator Systems

List of companies

Petrochemical Industry, Oil and Gas Industry, Power Plants Co-generation Plants, Refinery, Chemical Industry, Wood Industry, Steel Industry, Paper Industry, Palm Oil Industry, Industrial Boilers, Waste Heat Boilers

Who should attend

Plant Directors, Operations Managers, Maintenance Managers, Engineers, Asset Management Managers, Planners, Inspection Managers, Process Managers, Chemists, Loss Adjusters, Claims Managers and Underwriting Managers.

Class Size

Enrollment is limited to 20 students.

For more information, please contact

IDC TRAINING HOUSE SDN BHD

TEL: 03-7956 5126

WWW.IDC-TRAINING.COM

HRD Approved "Class A" Training Provider (since Year 2002). Registered with Ministry of Finance.

Water Cycle Chemistry, Corrosion, Failure Analysis & Remedy Measures on Steam Generator Systems



Testimonials

"IDC again, managed to get one of the best Trainer/speaker for another high quality seminar. Satisfied highly, as always!"

"Sometimes, we are not aware that the basic things can cause severe damage to our system. Through this training, the instructor has given some findings that is very important for us to apply and monitor."

"This course is very informative and specific. It is good and relevant for people who are involved in day-to-day boiler operation such as Operation, Maintenance and Inspection. Trainer is very experience in the subject matter and very helpful in discussion."

"Instructor's lecture is very clear; full with important information and easy to understand."

"The content of the presentation is comprehensive and sufficient to address failure analysis in boilers."

"By attending this course, I obtained a lot of knowledge on corrosion type and boiler treatment. I would like to encourage friends to attend this course."

"This course gave me the insight information about steam generator system. This course enhance my knowledge in preparing failure investigation report."

"The program was informative and I find answers why we are carrying out certain tasks in the plant."

"This training is good and provides a lot of basic knowledge regarding the effectiveness of the chemical treatment for the boiler system. At the same time, the experiences of the instructor is good in sharing all the knowledge regarding the failures that normally happens in boiler system."

Contents

1. Basics in Corrosion and Corrosion Protection
2. Principles and Forms of Corrosion
3. Iron, Steel and Stainless Steel in Boiler Operation
4. Boiler Types and Water Treatment
5. Water Quality and Chemical Operation Mode adapted to Boiler Design and Operation Conditions
6. Solubility of Relevant Compounds in Water and Steam
7. Boiler Feedwater, Boiler Water and Steam Requirements
8. Sampling of Water and Steam / On Line Control
9. Boiler Pre-Treatment and Chemical Cleaning of Boilers
10. Sampling, Preparation and Investigation Methods for Failure Analysis
11. Failure Cases on Boiler Parts / Failure Analysis
12. Discussion of actual problems

What I liked the most of the Training

- The Trainer's knowledge, experience and his willingness to share to others
- Examples from personal experiences backed by pictures - life example
- Practical case study, In-depth discussion
- Presenter has a high enthusiasm in subject matter and class delivery
- Pictures for Failure Investigation
- Detail explanation about the corrosion principle and sample of failure case
- The basic chemical treatment required for the boiler system
- The materials are hard to obtain from other resources. This information is helpful in my job.
- The materials covered are closely related to my work.

Water Cycle Chemistry, Corrosion, Failure Analysis & Remedy Measures on Steam Generator Systems



Day One

- **Basics in Corrosion and Corrosion Protection**
 - Basics in Corrosion / Corrosion Protection
 - Corrosion Element / Galvanic Cell / Potential
 - Protective Layers
- **Principles and Forms of Corrosion**
 - Uniform Corrosion / Local Corrosion (Pitting) / Galvanic Corrosion
 - Crevice Corrosion / Under Deposit Corrosion
 - Erosion Corrosion or Flow assisted Corrosion (FAC) / Cavitation
 - Selective Corrosion
 - Stress Corrosion Cracking (SCC)
 - Strain Induced Corrosion
 - Hot Water Oxidation (Steam Side Burning)
 - Fatigue / Corrosion Fatigue, Thermo-shock
 - On Load Corrosion / Physical & Chemical Hide-Out
 - Hydrogen Damage
 - Atmospheric Corrosion / Oxygen Corrosion
- **Irons, Steel and Stainless Steel in Boiler Operation**
 - General Considerations
 - Specific Consideration for Boiler Operation
- **Boiler Types and Water Treatment**
 - Boiler Types, Water Treatment and Definitions

Day Two

- **Water Quality and Chemical Operation Mode adapted to Boiler Design and Operation Conditions**
 - Make up Water Treatment
 - Condensate Polishing
 - Deaeration
 - Chemical Operation Modes for Feedwater and Boiler Water Solid alkalisation (CT/PT), All Volatile Treatment (AVT), Oxygenated Treatment (OT)
 - Treatment Programs and Boiler Design / Operation Conditions
 - Preservation
- **Solubility of Relevant Compounds in Water and Steam**
 - Effects to deposit formation in water phase
 - Effects to deposition in super-heaters and turbines
- **Boiler Feedwater, Boiler Water and Steam Requirements**
- **Sampling of Water and Steam / On Line Control**
 - Chemical Control of Power Plant Circuits
 - Manual Control
 - On-Line Control

Day Three

- **Boiler Pre-Treatment & Chemical Cleaning of Boilers**
 - Alkaline boil out
 - Acid Cleaning (Pickling)
 - Chemical Cleaning with other Chemical
 - Chemical Cleaning during operation
- **Sampling, Preparation and Investigation Methods for Failure Analysis**
 - Sampling of Solid / Metallic Specimen
 - Preparation and Investigation Methods
- **Failure Cases on Boiler Parts / Failure Analysis**
 - Oxygen Corrosion (pitting) / Shut-down Corrosion
 - Elevated Temperature Failures, Rapid / Long-term overheating of tubes
 - Stresses, Strain and Fatigue Failures
 - Hydrogen Damage
 - On Load Corrosion
 - Erosion Corrosion (FAC) and Cavitation
 - Stress Corrosion Cracking (SCC)
 - Failures during Chemical Cleaning
- **Discussion of actual boiler or treatment problems Assessment of samples brought by participants**

ABOUT IDC TRAINING HOUSE

IN-HOUSE TRAININGS AVAILABLE

IDC Training House is a leading Training Provider for corporate & government sectors; to both local & international market. Our strength lies in providing Trainers who are highly experienced & knowledgeable in their respective fields; in order to produce well-trained and qualified professionals to meet the demands of the new economy.

We specialize in human capital development in areas of **Soft Skills, Motivation, Leadership, Management, IT, ISO, Team Building, & Technical.**

If your company wishes to have a cost effective in-house training that is customized for your company,

Call us at

+60-3-7956 5126 / 5139

Or

Email to **info@idc-training.com**

For more programs offered by IDC Training House, please visit <http://www.idc-training.com>

For public workshops, please visit <http://www.idc-training.com/course-calendar.html>

Course: Water Cycle Chemistry, Corrosion, Failure Analysis & Remedy Measures on Steam Generator Systems

Date: 21 - 23 Apr 2010

Venue: IDC Training Room, Amcorp Trade Centre, PJ, Selangor, Malaysia

Time: 9am - 5pm

Name of Applicant(s) Mr / Ms / Dr / Ir (Others)	Designation(s)	Contact No. (H/P)
1. _____		
2. _____		
3. _____		
4. _____		
5. _____		
Company Name :		
Correspondence Address :		
Tel : _____ Ext. : _____ Fax : _____		
H/P : _____ E-mail : _____		
Contact Person :		Designation :

	Group Package Minimum 3 delegates	Early Bird Package (with payment)	Normal Package
Course Fee (per person)	RM 4,800	RM 5,000	RM 5,300
Closing Date	21 Mar 2010	5 Mar 2010	21 Mar 2010

Please download the location map from: http://www.idc-training.com/map/idc_map.pdf

**Register NOW
& save more
with Early Bird
Package !!**



Certificate of Attendance upon completion of the course



Save more with In-House Training



Save more with group of 3 delegates

Terms and Conditions Registration Policy

Fees include course materials, lunch & tea breaks. Payment can be made by cash, credit card or using crossed cheque/bank draft made payable to **IDC Training House Sdn Bhd**, fourteen (14) working days prior to the date of the program. Otherwise registration(s) is treated as unconfirmed.

Disclaimer

Changes of course date, Trainer/Facilitator or venue

We reserve the right to make alternative arrangement to the above if the needs arise due to unforeseen circumstances. Every effort will be made to inform the participants of these changes.

Additional Expenses

We shall not be responsible for any extra expenses incurred by any participant(s) while attending the course.

REGISTER NOW! FAX TO US AT +60-3-7956 1536