

# Performance and Reliability Audit of Boiler and its Water Treatment System

## TRAINING WORKSHOP

**Venue:** The Vedic Village Spa Resort, Kolkata.

**Date:** 29<sup>th</sup>, 30<sup>th</sup> & 31<sup>th</sup> Jan 2018

Conducted by

**INDIA BOILER DOT COM**

promoting a favourable environment for power plants



## Introduction:

The Performance and Reliability of the Boiler system directly and most significantly affect the profitability and availability of any Power and Process utility Plant. However, we need not be a rocket scientist to understand the engineering principle on which a boiler works and ensure best performance. Boiler has to convert the chemical energy of the fuel in to heat energy first, and then transfer it in to water and steam. It's very simple. If we can maximize the energy conversion and then ensure maximum energy transfer, we can definitely ensure maximum performance. OEM guideline can be a big help to achieve that. But the OEM guideline is prepared based on certain design conditions. The problems start when the existing conditions are deviating from the design conditions, which, unfortunately, happen invariably, with almost every boiler system.

Again, Boiler performance and reliability of its pressure parts are quite often interrelated. Sometimes, in order to achieve the performance, the reliability gets compromised. One therefore, should take a holistic approach to audit the performance and reliability of the boiler system and find out the optimizing opportunities.

With regards to reliability again, improper water chemistry is considered to be one of the major contributors and therefore require special attention. Broadly speaking there are three kinds of problems commonly noticed in boiler systems that can be attributed to the waterside. They are scaling, corrosion and carryover. Quite often these problems are interrelated, one leading to another. Sometimes boiler configuration and operation can also be responsible for waterside problems. A complete system audit of the entire water-steam-condensate cycle is necessary to identify the source of the problem and suggest remedies.

In this training workshop, our experts would guide the participating O&M professionals to go through the step by step Audit check points which they can use at their own system. In order to explain and elaborate on each audit points, we will use small case studies. If the participating organizations are willing, then we can also use real plant conditions of the participating industries for these exercises. The plant conditions of the first four willing participating organization would be taken up as case studies during the exercises. The plant details and operating parameters from these organizations would be needed at least twenty days before the commencement of the workshop in a standard format that will be issued to them.

## Performance Audit Check Points

- ☛ Fuel System
  - Fuel Characteristics: Factors that affects the combustion mechanism and effect of deviation from the design fuel
  - Fuel handling and preparation: Factors that are required to be adjusted to match with the deviation in fuel characteristics. Performance check points for auxiliary components in fuel handling and preparation system.
- ☛ Combustion Air System
  - Assessment of required air quantity
  - Assessment of proper Distribution of air
  - Performance check points for auxiliary components in Air system
- ☛ Combustion system
  - Factors important for proper combustion
  - Steps for combustion optimization
- ☛ Flue Gas System
  - Modes of heat transfer at various sections and factors affecting the same
  - Gas temperature mapping of furnace and second pass and its analysis
  - Analytical approach to optimize soot blowing operation
  - Factors leading to slagging and fouling
- ☛ Water System
  - Audit check points for Deaerator, Heaters and Economizer performance



- ☛ Steam System
  - Factors affecting attemperation
  - Effect of steam parameters in Power Cycle efficiency
- ☛ Condensate system
  - Audit check points for Condenser performance
- Evaluation of process condensate recovery performance
- ☛ Ash Evacuation System
  - Proper method of ash sampling and measuring un-burnt

### Reliability Audit Check Points for Boiler:

- ☛ Factors affecting the health of Metallurgies used in various pressure parts
- ☛ Limitations of these Metallurgies
- ☛ Indication of possible over heating
- ☛ Factors leading to tube erosion and their location
- ☛ Factors inducing Fatigue damage in pressure parts and their location
- ☛ Factor leading to fire side corrosion
- ☛ Factors leading to water side corrosion and parameters to be monitored
- ☛ Factors leading to water side scale in small boilers
- ☛ Factors leading to carryover and Turbine fouling and its control parameters

### Reliability Audit Check Points for Water Treatment System:

- ☛ Audit of the pre-treatment scheme (clarifier, filter, etc.)
- ☛ Audit of the secondary treatment scheme (softener, RO, mixed bed, etc.)
- ☛ Audit of the deaerator (checking dissolved oxygen in boiler feedwater)
- ☛ Audit of the water/steam/condensate sampling system
- ☛ Audit of the analytical facility in the chemical laboratory
- ☛ Review of the ongoing boiler water chemical treatment programme
- ☛ Audit of the chemical preparation and dosing system
- ☛ Audit of the water chemistry maintained starting from make up to condensate
- ☛ Audit of blow down losses and condensate recovery
- ☛ Reviewing possibility of waterside failure due to any unforeseen reason
- ☛ Audit of steam purity and possibility of turbine deposition
- ☛ Reviewing possibility of problem from contaminated process condensate
- ☛ Auditing fireside combustion and deposition related problems

### Course Structure:

7 days pre-training interaction

3 days classroom training

10 days post-training follow-up session.

### Virtual Classroom:

After registration, each participant would be provided with a username and password to access the Virtual Classroom for this training at our website [www.indiaboiler.com](http://www.indiaboiler.com). First, there will be a pre-training session for 10 days, where the participants would be offered a soft copy of the study material and a guideline. Each participant can indicate what they expect to gain from this training.

There would be 10 days follow-up interaction through Virtual Classroom between the participants and the faculties after the completion of the classroom training. This will increase the opportunities for more detail discussion on the large number of topic covered under the course module.

### Special feature: Performance and reliability audit exercise with real plant conditions :

A participating organisation willing to submit their own plant system details for the Audit exercises should contact us latest by 10<sup>th</sup> January 2018.

**Date:** 29<sup>th</sup>, 30<sup>th</sup> & 31<sup>th</sup> Jan 2018

**Time:** 9.30 AM to 5.00 PM

**Venue:** The Vedic Village Spa Resort, Shikharpur,  
P.O. Bagu, Rajarhat Lauhati, New Town-Rajarhat, Kolkata-700135.

### Programme Fees:

- 1. Non-Residential: INR 17,500/- per candidate + GST**
- 2. Residential twin sharing: INR 30,000/- per candidate + GST**  
[Accommodation will be offered on Twin sharing basis]
- 3. Residential single: INR 40,000/- per candidate + GST**  
[Accommodation will be offered on Single occupancy basis]
- 4. Overseas participants: USD 1100 per candidate**  
[Inclusive of all taxes] [Overseas participation is on single occupancy basis residential only]

*The Workshop registration fee for Non-residential participants includes:*

- Lunch and Mid-session tea and coffee breaks

*The Workshop registration fee for Residential & Overseas participants additionally includes:*

- Stay for 3 nights at The Vedic Village Spa Resort, Kolkata
- Breakfast & Dinner
- Complimentary usage of swimming pool, gym, library and indoors games.
- Redeemable Spa coupon worth INR 500/-

*The accommodation will be available from 13.00 hrs on 28<sup>th</sup> January to 11.00 hrs on 31<sup>st</sup> January 2018.*

*If any participant wants to extend his / her stay further, then it has to be done at their own cost.*

### Registration Procedure:

Nominating organization should send duly filled registration form along with a demand draft on the course fees. DD/ Cheque should be prepared in the name of **India Boiler dot Com**, payable at Vadodara. For overseas nomination, the fee has to be Swift transferred to our account.

**CONTACT FOR REGISTRATION:**  
Programme Coordinator



**INDIA BOILER DOT COM**  
promoting a favourable environment for power plants

B-2 Miraj Apartment, Near Natubhai Circle,  
Inox Cinema Road, Race Course(w), Vadodara-390 007.

☎ 0265 – 2386658 / 2388339

☎ 9824277793 / 9265388826 / 9099933061

✉ e-mail: [info@indiaboiler.net](mailto:info@indiaboiler.net) / [info@indiaboiler.co.in](mailto:info@indiaboiler.co.in) /  
[info@indiaboiler.in](mailto:info@indiaboiler.in)