MERIM ENGINEERING CONSULTING FZCO

Power Plant Performance, Efficiency & Optimization

Heat Rate Analysis and Calculations Examples

Dubai UAE

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TRAINING OBJECTIVES

- Understand the major aspects in GT, Boiler and Desalination Plant
- Be able to do Basic Performance Calculations
- Be able to know and understand how to calculate Heat Rate
- Discuss the details of Heat Rate Concepts
- Explain Controllable and Non– Controllable losses
- Explain the effects of component performance on operating Costs.
- Discuss how heat rate affects operating practices, unit optimization, and environmental compliance.
- Assess Heat rate Issues using knowledge gained in Heat rate Awareness.
- Explain the development of a performance improvement plan.
- Explain how to identify / correct Heat Rate deficiencies.

WHO SHOULD JOIN?

This training course is well-suited for a wide array of professionals, but will greatly benefit:

- Operations & Maintenance (O&M) Engineers
- Managers and Supervisors
- Top and Middle Management
- Equipment Professionals
- Project Developers and Owners
- High-Level Power Plant Operators and Technicians (O&M)
- Process Plant Technical Professionals: Engineers, Technicians and Operators

TRAINING METHODOLOGY

The 5-days course is presented through a mixture of lectures, tutorials and worked examples. Soft course material is provided for delegates use during and after the course. Active participation from the delegates is strongly encouraged particularly during the worked examples in order to consolidate learning. All delegates will receive Certificate of Attendance upon completion of this course.

- During the program will be applied Pre-Assessment & Post-Assessment Questioneres.
- Daily Evaluation Feedback
- Final Evaluation Feedback after the Training Completion
- Final Report

ORGANIZATIONAL BENEFITS

- Improved socioeconomic implications for job creation in the organization
- Enhanced marketing, image, and competitiveness of the organization
- Reduction of operation and maintenance costs
- Optimization of project implementation times
- Guidance on the timing and frequency of plant maintenance schedules
- Positively enhances organizations' financial health, via increase in revenues

PERSONAL BENEFITS

- Understanding the health and safety expectations from on-site personnel
- Personal development and career growth and advancement
- Improved personnel key-performance-indicators (KPIs)
- An understanding of the environmental impacts of plant from its theory and design
- Improved technical expertise for plant operations and maintenance staff
- Broad understanding of the Power Plant Perfomance

TRAINING INSTRUCTORS

MERIM Engineering Consulting has a large and diverse team of expert trainers and consultants, all of whom meet MEC rigorous standards, and are proven professionals. With varied technical expertise in relevant areas of engineering, project management and development, organizational effectiveness and human capital development and management, amongst others.

TRAINING MODULES

Day – 1:

Module (01) Overview of Performance Monitoring

1.1 Concept of Performance Monitoring

1.2 ASME Test Codes

1.3 Performance testing versus online Monitoring

1.4 Performance Curves

1.5 Expected performance from Curves

1.6 Additive Performance Factors

1.7 Model-Based Performance Analysis

1.8 Data Validation

1.9 Statistical Analysis of Monitored Values

Module (02) Heat Balance Analysis

2.1 Heat balance Monitoring & Calculations

2.2 Combined Cycle Overall Plant Heat Balance

2.3 Combined Cycle Balance using Commercial Software

2.4 Rankine-Cycle Overall Plant Heat Balance

2.5 Rankine-Cycle Balance using Commercial Software

Module (03) Techniques for Enhancing Plant Performance

3.1 Preventive Maintenance

3.2 Predictive Maintenance

3.3 Overall Plant Expected Performance Models

3.4 Root Cause Failure Analysis

3.5 Condition Monitoring Procedures

TRAINING MODULES

Day – 2:

Module (04) Impacts of Degradation on Overall Plant Performance

4.1 Definition of Plant Impacts
4.2 Gas Turbine Impacts
4.3 Heat recovery Steam
4.4 Generator Impacts
4.5 Steam Turbine Impacts
4.6 Boiler Impacts
4.7 Feed water Heater Impacts
4.8 Condenser Impacts
4.9 Inlet Air Filter Impacts
4.10 Exhaust Pressure Loss Impacts

Module (05) Steam Turbine Performance

5.1 ST Configurations
5.2 Seals and Leaks
5.3 ST Thermal Performance
5.4 ST Heat balance Analysis
5.5 Curve-Based Expected performance
5.6 Model-Based Expected ST Performance
5.7 Building ST Expected Performance Models
5.8 ST Degradation
5.9 Stage & Cylinder Efficiency- Throttle vs Nozzle Gov
5.10 Efficiency Vs. Load
5.11 Feed-Heating

Module (06) Gas Turbine Performance

6.1 Power Generation
6.2 Airflow, Firing Temperature & Pressure Ratio
6.3 Correction Curves (Base load Performance)
6.4 Part-Load Performance (Industrial Engines)
6.5 Aero derivative Engine Performance
6.6 Overall GT Heat Balance
6.7 Model based GT Heat Balance
6.8 GT Performance Evaluation
6.9 Experience with measured Data from Operating Degradation and Engine Life

TRAINING MODULES

Day – 3:

Module (07) Heat Recovery Steam Generator Performance

7.1 Overview
7.2 Duct Burner
7.3 HRSG Efficiency and Effectiveness
7.4 HRSG Heat Balance Analysis
7.5 Impact of Fouling on HRSG Performance
7.6 HRSG Performance Evaluation
7.7 Example of Performance Analysis Fouled HP Evaporator

Module (08) Boiler Performance Characteristics

8.1 Fuels & Combustion Efficiency
8.2 Boiler Efficiency Testing- ASME Codes
8.3 Combustion Calculations
8.4 Theoretical Air
8.5 Boiler Losses
8.6 Boiler heat Balance Analysis
8.7 Model based Boiler Heat Balance Analysis
8.8 Expected Boiler Performance
8.9 Routine Performance Monitoring
8.10 Boiler Degradation
8.11 Soot blowing Analysis

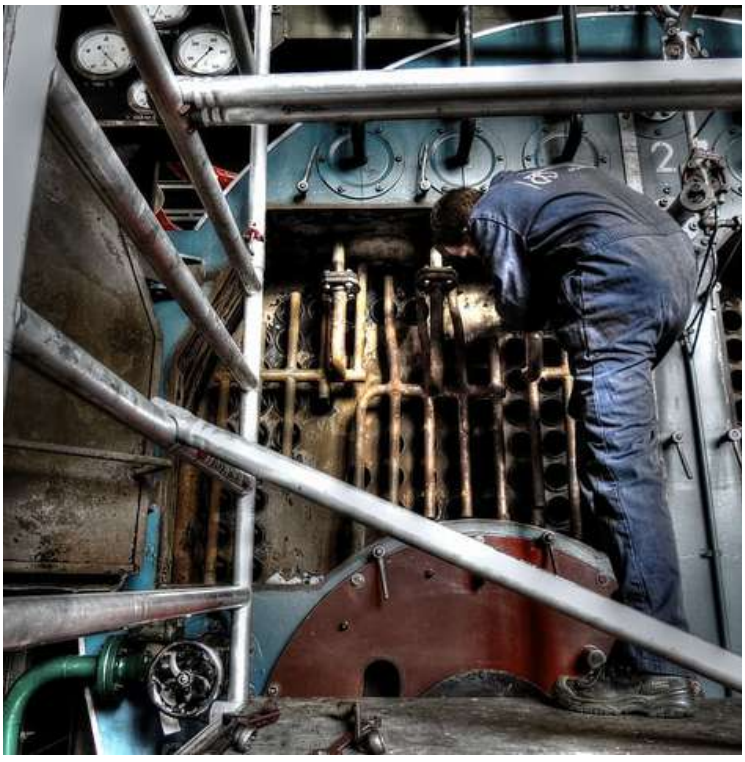
Day – 4:

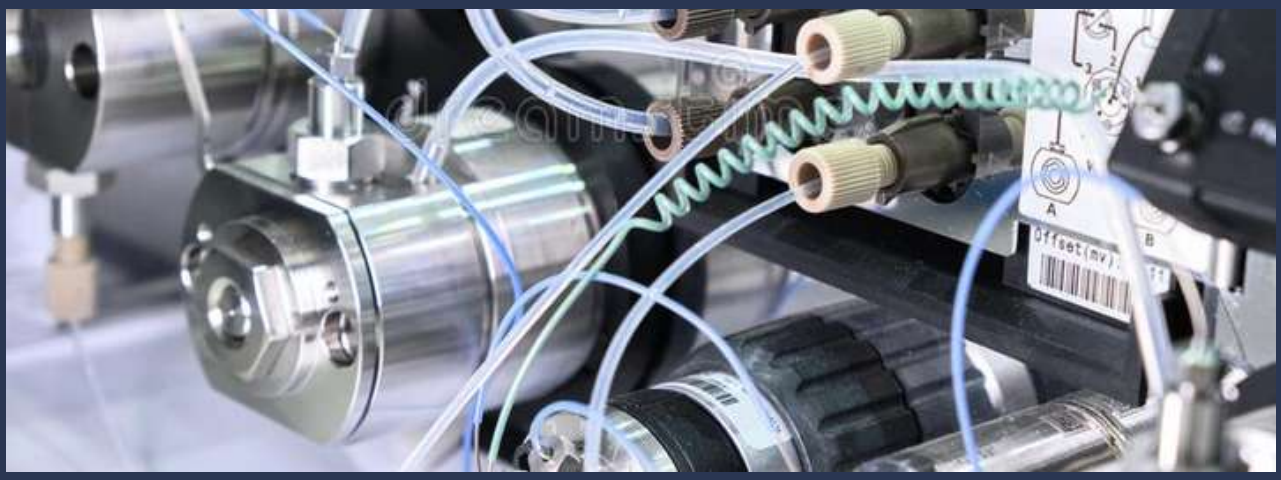
Module (09) Boiler Components Performance

9.1 Air Heater Heat Balance Analysis
9.2 Air Heater Expected Performance
9.3 Air Heater Degradation
9.4 Deaerators, Drums, and Open Heaters Performance
9.5 Condenser Elements & Arrangements
9.6 Condenser Heat Balance Analysis
9.7 Condenser Expected Performance
9.8 Steam Ejectors Performance

Module (10) Cooling Tower Performance

10.1 Overview
10.2 Cooling Tower Performance Curves
10.3 Cooling Tower Heat Balance Analysis
10.4 Expected Cooling Tower Performance
10.5 Cooling Tower Degradation





TRAINING MODULES

Day – 5:

Module (11) Pump Performance

11.1 Overview
11.2 Extended Bernoulli Equation
11.3 Pump Curves
11.4 Affinity Laws
11.5 Corrected Pump Performance
11.6 Pump Flow Control
11.7 Model-based Pump Performance
11.8 Pump Degradation

Module (12) Co-generation of Power and Desalination Plants Performance

12.1 Overview
12.2 Thermal performance in co-generation plants
12.3 Enhancement of performance ratio and thermal efficiency
12.4 Economic impacts of electric power – desalination plants

Module (13) Heat Rate Analysis and Calculations

13.1 Basics of Heat Rate Calculations
13.2 Heat Rate Calculations for Electric Power Generating Plants
13.3 Heat Rate Calculations in Co-generation Systems
13.4 Performance and Heat Rate Calculations in Desalination Plants

QUESTIONS? CONTACT US.

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