



A Partner Of



DUBAI
KNOWLEDGE
VILLAGE

Early Bird Discount

Every delegate registering and
paying before **10 April** will
get **15% Discount**

In Cooperation with:



Leading the World to Better Performance

Heat Rate Awareness for Power Plants

How can you maximize the performance of your Power Plant?

May 10 - 14, 2009 - Millennium Hotel, Sharjah, U.A.E

Presented by:



Ron Griebenow, P.E
Director - Energy Services
General Physics Corporation, USA



Eng. Moh'd A. Al-Temnah
ASME Authorized Global Instructor, USA
Technical Training Freelance Trainer



+971 4 3622021

+971 4 3678636

info@apex-dubai.com

www.apex-dubai.com

Introduction

The Arabian Gulf and other neighboring areas are deeply concerned with insuring that their power plants are available during the long cooling season. Already, several major systems had to curtail services and work with rotating blackouts because of such problems as: unavailability of power plants at the needed periods, de-rating of plant output and other factors. By maintaining the heat rate of a generating unit at its optimal level, one is assured of proper functioning of the unit. Furthermore, knowledge of the heat rate allows for the overall economic operation of the entire power system.

The main goal of this course is to make power plants more reliable, efficient and environmentally compliant. This requires personnel training on combustion optimization of advanced equipment, condition monitoring and testing that are directed toward plant and personnel performance enhancement.

Who should attend?

This course is designed for Engineering, Technical Senior Operations Personnel who have a working knowledge of Power Cycles and thermodynamics with responsibility for Heat Rate improvement.

Also, all engineers who responsibility of efficiency calculations of Power plants.

What Will You Learn?

By the end of this course all participants should be able to :

1. Discuss the details of Heat Rate Concepts
2. Explain Controllable and Non- Controllable losses
3. Explain the effects of component performance on operating Costs.
4. Discuss how heat rate affects operating practices, unit optimization and environmental compliance.
5. Assess Heat rate Issues using knowledge gained in Heat rate Awareness.
6. Explain the development of a performance improvement plan.
7. Explain how to identify / correct Heat Rate deficiencies.

Course Outlines

DAY ONE

Module (1) Introduction

- 1.1 Overview of Heat Rate of Power Plant

Module (2) Power Plant Thermodynamics

- 2.1 Using the Steam Tables
- 2.2 System Efficiencies
- 2.3 Power Plant Systems
- 2.4 Power Plant Cycles
- 2.5 Definitions of Heat Rate

2.6 Exercises and Practices

Module (3) Calculating Cost of Heat Rate Deviations

- 3.1 Factors in Calculation Heat Rate Cost
- 3.2 Calculating the cost of Heat Rate Deviations

3.3 Exercises and Practices

DAY TWO

Module (4) Controllable losses

- 4.1 Percent Change
- 4.2 Main Steam Pressure
- 4.3 Main Steam Temperature
- 4.4 Hot Reheat Temperature
- 4.5 Condenser Pressure
- 4.6 Final Feedwater Temperature
- 4.7 Spray Flows
- 4.8 Auxiliary Steam Flow
- 4.9 Auxiliary Power
- 4.10 Excess O₂
- 4.11 Exit Gas Temperature
- 4.12 On Line Controllable monitor
- 4.13 How to minimize the losses

4.14 Exercises and Practices

Module (5) Boiler

- 5.1 Boiler Efficiency
- 5.2 Boiler Degradation
- 5.3 Off Design Fuel
- 5.4 Environmental Considerations
- 5.5 Optimizing Boiler Efficiency
- 5.6 Boiler Tube Leakage
- 5.7 Boiler Tube Failure

5.6 Exercises and Practices

Course Outlines (cont'd)

DAY THREE

Module (6) Turbine

- 6.1 Turbine Efficiency
- 6.2 Turbine Cycle Heat Rate

6.3 Exercises and Practices

Module (7) Condenser

- 7.1 Condenser Performance Variables
- 7.2 Condenser Degradation
- 7.3 Heat Rejection

7.4 Exercises and Practices

Module (8) Feedwater Heaters

- 8.1 Feedwater Heater Performance Variables
- 8.2 Feedwater Heaters out of Services
- 8.3 Optimizing Feedwater Heater Efficiency

8.4 Exercises and Practices

DAY FOUR

Module (9) Others Equipments

- 9.1 Cooling System
- 9.2 Pumps

Module (10) Optimization Tools

- 10.1 Logic / Decision Trees
- 10.2 Performance Testing
- 10.3 Preventive Maintenance Programs
- 10.4 Optimization Studies
- 10.5 Performance Monitoring Systems
- 10.6 Simulators for Heat Rate improvement
- 10.7 Instrument Data Validation
- 10.8 Rules of Thumb

10.9 Exercises and Practices

Module (11) Cycle Isolation

- 11.1 Start up Drains
- 11.2 Feedwater Heater Emergency/Alternate Drains
- 11.3 Feedwater Heater, Feedwater bypass
- 11.4 Steam Traps
- 11.5 Steam Seal System
- 11.6 Feedwater Heater vents
- 11.7 Safeties
- 11.8 Boiler feed Pump and Turbine
- 11.9 Managing Cycle Isolation

11.10 Exercises and Practices

Module (12) Instrumentation Effects on Heat Rate

- 12.1 Instruments that impact Performance Calculations
- 12.2 Temperature Measurement
- 12.3 Pressure Measurement
- 12.4 Flow Measurement
- 12.5 Excess oxygen Measurement
- 12.6 Electrical Measurement
- 12.7 Instrument Redundancy
- 12.8 Calibration Procedures
- 12.9 Station Calibration Standards
- 12.10 Control System impacts on Heat Rate

12.11 Exercises and Practices

DAY FIVE

Module (13) How does My Job relate to Heat Rate?

- 13.1 Effective Performance Program Qualities
- 13.2 Management Commitment
- 13.3 Heat Rate Awareness Training
- 13.4 Dedicated Performance Personnel
- 13.5 Instrumentation and Data Validation
- 13.6 Heat Rate improvement Task Force
- 13.7 Periodic Test Program
- 13.8 Test Procedures
- 13.9 On Line Performance Monitoring
- 13.10 Cycle Isolation Routes

13.11 Exercises and Practices

Review, Feedback and Discussion

Attachments:

- A. List of Equations
- B. Abbreviated Steam Tables
- C. Common Conversion Factors
- D. Rules of Thumb
- E. References



COURSE INSTRUCTORS

Ron Griebenow, P.E

Ron Griebenow is a Director for General Physics Energy Services Division. His primary focus is mergers, acquisitions and partnerships that will help to expand GP's capabilities in improving performance and availability of electric power generating facilities. He has over 25 years experience in power plant performance and operations training for the electric power industry.

Ron joined GP through the acquisition of Performance Consulting Services, Inc., where he was the President and one of the co-founders. PCS specialized in engineering support, training, and software products directed toward increasing plant performance and availability, optimizing manpower usage, and reducing overall operating costs. In addition to his responsibilities for corporate management and business development for PCS, he spent 8 years on contract to the Electric Power Research Institute as the Director of EPRI's Fossil Plant Simulator and Training Center. His responsibilities there included development and management of the Center, management of EPRI fossil plant simulator and training projects, and technology transfer to EPRI member utilities.

Prior to joining PCS, Ron worked in several areas including; Project Manager for Science Applications International Corporation, Director of Training and Consulting for HALLIBURTON's Performance Systems Department; General Engineer at Santee Cooper, involved in performance testing and analysis for nine coal-fired electric generating units; and Performance Program Manager at Energy Incorporated, responsible for development, sales and support of the PEPSE computer program.

Ron received a B.S. degree in Mechanical Engineering from University of Idaho. He is a member of the ASME, a member for ASME's Committee for Certification of Operators of High Capacity Fossil Fuel Fired Plants, and a registered Professional Engineer in the state of South Carolina.

Eng. Moh'd Al-Temnah

Engr. Al- Temnah is currently Technical Training Freelance Trainer with APEX Company, based in Knowledge Village Dubai UAE. He is mechanical engineer and ASME Authorized Global Instructor and Competency Workplace Assessor with international experience in Power Generation Plants, Water Treatment, Waste Water, Tank Farms, and Electrical Systems

Mohammed's work is to align organizational vision, strategies, employees with technology, processes and culture to realise bottom line results.

He also was a member of the Formation Team of Power & Water Utilities (**MARAFIQ**) and having Technical and Engineering qualifications, he has demonstrated efficient achievements in operations, maintenance and Human Resource Development of Power & Desalination Plants.

With over 24 years experience in Power & Water utility industries in Saudi Arabia, UAE, Oman, Qatar and Egypt, and demonstrated concrete achievements in operations and maintenance projects.

Course Fees:

The amount of 3500 USD will be charged for the course. Send (3) delegates and get a **10% discount** on the third participant.

Payment Method:

All payments should be in favor of Apex FZ-LLC. Account details are as follows:

**HSBC Bank Middle East limited,
Jebel Ali Branch, Dubai, UAE
A/C: 035 - 626472 - 100**

Cancellation Policy

If you are unable to attend the course you may send a substitute delegate.

Cancellation should be made 20 days prior to the course conduction. Failure to cancel within 10 days will be required to pay the course fee in full amount.

Course Coordinator: Mr. Ahmed Al-Gohary
Mobile : +971 50 1728446 (UAE)
: +966 50 1003553 (KSA)
E-mail : tc@apex-dubai.com
Website : www.apex-dubai.com