



2KG TRAINING

2KG TRAINING

POWER GENERATION: Basic Operation and Theory of Steam and Gas Turbines, Co-Generation, and Combined Cycle Plants

Presenter: Claire Soares

ABOUT THE PRESENTER: CLAIRE SOARES

CLAIRE SOARES is a registered professional engineer in Alberta, Canada. She is a Fellow of the American Society of Mechanical Engineers (ASME), and has her B.Sc.Eng in Mechanical Engineering. Her M.B.A. is in International Business. Her career began in computational fluid dynamics working for Brian Spalding in Imperial College, London, on the COBALT project. She worked on developing structural patents for the marine and power distribution industries in England and Canada. She began her rotating machinery career in power generation & oil sands production at the Syncrude site in Fort McMurray, Alberta, moving to conventional oil & gas production with Esso Resources. Gas turbine systems continued to be her emphasis as she shifted to aero-engines. She worked for the Canadian Air Force as Propulsion Systems Manager and was senior engineer for Ryder Airline Services Division in the USA, where she ran technical support for 250 mechanics and their supervisors, and later became manager of the V2500 engine repair program. Her work with the International Gas Turbine Division of ASME, for whom she organized numerous conference sessions, continues to complement her current work within the power generation, oil & gas and aero-engine sectors. She is now an independent consultant, trainer, and writer.

Number of days: 4

Cost: R14 575 excl VAT

CPD Points: 4

COURSE OBJECTIVE

- Upon completion of this course, participants will gain a basic understanding of the main components and subsystems of gas turbine systems, steam power plants, co-generation, and combined cycle plants.
- Participants learn to critique the advantages, applications, performance, and economics of co-generation and combined cycle plants.
- They will learn about various auxiliary systems including instrumentation, controls and monitoring systems, deaerators, and feed water heater systems and will learn some basics about transformers and generators.
- Participants will discover the basics required in minimizing operating cost and optimizing efficiency, reliability, and component longevity for gas turbine and steam power plants.
- They will learn about the monitoring and control of environmental emissions and gain some insight into predictive and preventive maintenance, reliability, and testing.
- Finally, they will discover some of the latest technology applicable to the areas covered and identify methods for self-improvement

WHO SHOULD ATTEND

Engineers, technologists, operations, maintenance, repair and overhaul, systems optimization and performance verification, specification, retrofit design, business and management of power systems and personnel, and support of power generation trains and their support systems

Personnel can be involved in both large scale commercial power production and small in-house production

While this course is of major benefit to newer people in the field, it is also valuable as a revision and technology update for more experienced personnel.

POWER GENERATION: Basic Operation and Theory of Steam and Gas Turbines, Co-Generation, and Combined Cycle Plants cont...

COURSE OUTLINE

Review of Thermodynamics Laws

- First law of thermodynamics
- Enthalpy, property relationships, vapor-liquid phase equilibrium in a pure substance
- Second law of thermodynamics
- Entropy, Carnot cycle

Steam Power Plant Basics

- Rankine cycle
- Reheaters, condensers, deaerators, regeneration
- Feedwater heating
- Efficiency and heat rate of power plants
- Co-generation, types of co-generation
- Critical steam advancements, application cases

Steam Turbine Basic Components and Main Systems

- Steam turbine components
- Steam turbine control systems
- Lubrication system, bearings

The Steam Turbine Governing System Basics

- Major components
- Turbine operation
- Turbine run up, tripping signals, turbine trip, load rejection, decrease in boiler pressure, hydraulic fluid

Gas Turbines

- Advantages of Gas Turbines (GT) versus steam turbines operation
- Gas Turbine simple cycle
- Gas Turbine compressor module
- Combustor module
- Turbine module
- Gas Turbine applications
- GT design for maximizing turbine inlet temperature, application cases
- Advances in GT design: "G" and "H" technology
- Accessory drives

Gas Turbine Lubrication and Fuel Systems

- Lubricating systems
- Gas fuel systems
- Liquid fuel systems
- Dual fuel systems
- Fuel types, expanding range of usable fuels, application cases
- Treatment for trace metals and sulfur

Combined Cycles and Other GT Cycle Modifications

- Non-ideal Brayton cycle
- Modifications to the Brayton cycle
- Closed cycles, complex cycles, combined cycles
- Regeneration, compressor intercooling, turbine reheat, water injection
- Combined heat and power

Gas Turbine Intake and Exhaust Systems

- Intake systems, inlet air filtration (inlet air fogging: see last topic)
- Exhaust systems

Gas Turbine Instrumentation and Control (I&C) Systems

- Gas Turbine protection (including pressure switches)
- Instrumentation and control systems
- Instrumentation used for vibration analysis
- Start-up sequence, normal operation (including temperature/PCD control sequence during start-up and normal operation, power limiting, decel limiting) and shutdown
- Black start system

Gas Turbine Emission Guidelines and Control Methods

- Emissions from gas turbines
- General approach for a national emission guideline, NO_x emission target levels
- Low NO_x combustors, ultra low NO_x combustors
- Power output allowance, heat recovery allowance
- Emission levels for other contaminants
- Size ranges for emission targets water and steam injection, selective catalytic reduction (SCR)

POWER GENERATION: Basic Operation and Theory of Steam and Gas Turbines, Co-Generation, and Combined Cycle Plants cont...

COURSE OUTLINE Cont...

Gas Turbine Performance Verification and Maintenance

- Gas Turbine performance verification and basics of performance analysis
- Compressor cleaning
- Gas Turbine maintenance methods (predictive, preventive)
- Basics of life cycle assessment

Generator, Exciter, and Other Electrical System Basics

- Generator, cooling systems
- Excitation
- Grid interconnection
- Transformer lubricating oil system
- Electrical and control package, Distributed Control System (DCS)
- 28 VDC system, 125 VDC system

Combined Cycle and Co-Generation Plant Basics

- Heat recovery steam generator basics and requirement of chrome-moly steel
- Equipment availability, maintenance cost, operational cost, turbine cost, training laws
- Heat of condensation
- Pipework to steam host, requirement of steam host
- Economics of combined cycles/cogeneration, guidelines
- Applications of co-generation and combined cycle plants

Economics of Combined Cycle and Co-Generation Plants

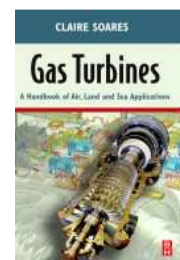
- Deregulation and tax incentives, SPPs (Small Power Producers), IPPs (Independent PPs), MPPs (Merchant PPs)
- Natural gas prices and economic growth
- Financial analysis
- Capital cost, operating and maintenance cost
- Economic evaluation of different combined cycles configurations
- Electricity tariff factors

YOU WILL RECEIVE:

Included in the seminar is the text:

Gas Turbines: A Handbook of Air, Land and Sea Applications, by Claire Soares

No other current publication offers the professional engineer or technician the wealth of useful guidance on nearly every aspect of gas turbine design, installation, operation, maintenance and repair as this book does.



Registration Form: POWER GENERATION

Number of days: 4

Cost: R14 575 excl VAT

CPD Points: 4

How to register for the course:

1. Complete this registration form and fax it to Phindi Mbedzi: Tel: 011 325 0686 Fax: 011 325 0488 Email: Phindi@2kg.co.za
2. Acknowledgement will be emailed to you.
3. Final confirmation and details will be faxed or emailed to you approximately 7 days before the commencement of the seminar.

Conditions of entry:

1. Cancellations are accepted in writing and without penalty, up to 7 working days prior to commencement of the seminar.
2. Cancellations in writing less than 7 working days prior to the seminar will be liable to pay 20% cancellation fee.
3. If prior written notification of cancellation is not received, defaulter will be liable to pay 50% cancellation fee.
4. In case of insufficient applications for the workshop 2KG reserves the right to cancel the seminar. Applicants will be informed and all fees will be refunded immediately.

Delegate information:

Title: _____ Surname: _____ Name: _____

Full Company name: _____ Job Title: _____

Postal Address (to which invoice must be sent): _____

Code: _____ VAT number: _____

Tel: () _____ fax: () _____

Cell: _____ Email: _____

Contact/ Accounts information:

Title: _____ Surname: _____ Name: _____

Tel: () _____ fax: () _____

Cell: _____ Email: _____

Please tick the course that you would like to attend:

03–06 February 2014: Johannesburg, Mintek

I have read and agreed to all the conditions of registration as stipulated in this brochure.

Signature

Date

For more info and to register contact Phindi Mbedzi on tel: 011 325 0686 or cell: 071 125 6188 and email: phindi@2kg.co.za or visit www.2kg.co.za