

## Who we Are ?

Salamah Consulting Engineering (SaCEn) is a firm specializing in engineering services, engineering training, Industrial equipment supply, and trade. SaCEn Mission is to Provide clients with global professional engineering solutions for all types of industries from concept planning through project completion, with a highly skilled professionals working together, using common sense and practical experience.

## Course outline

- Oil/gas fired steam generators
- Waste heat boilers and HRSGs
- Applied heat transfer
- Fuels, Combustion, Water Chemistry
- HRSG simulation
- Pollution control

## Who Should Attend

The course is designed for steam plant professionals in the Chemical industry, refineries, cogen plants and power plants, whose functions Include:

- Process engineering , technical services related to steam generation and energy recovery.
- Plant engineering, Design, trouble shooting and operation of steam generators, waste heat boilers and HRSGs.
- Optimizing life cycle costs of steam generators.

## Course Director

Mr. V.Ganapathy is a Boiler Consultant with 30 years of experience in engineering of Steam Ge-nerators and Waste Heat Boilers with emphasis on thermal design and performance aspects. These include 10 years at BHEL Trichy, 2 years at Struthers Thermo Flood in Kansas and 18 years at ABCO Boilers in Abilene, Texas. Since 2003 he is a Boiler consultant in Chennai, India. Mr. Ganapathy holds a B.Tech degree from IIT, Madras in Mechanical Engineering and MSc Engineering from Madras University. Mr. Gan-apathy has conducted several courses on Boilers and Heat Recovery in India for Reliance, L&T Baroda, IPCL and at a few organizations in Mumbai and Abroad at PDVSA, Venezuela and RIPI, Tehran. He has authored over 250 articles on Boilers, Heat Recovery and Boiler Heat Transfer Calculations, which have been publish-ed in numerous professional journals such as Chemical Engineering, Hydrocarbon Processing, Power Engineering, Plant Engineering and Chemical Engineering.

## 3 ways to Register

Email :  
**training@salamahconsulting.com**

Website :  
**www.salamahconsulting.com**

Call :  
**Off :+966 03 8670307**

Mob : 00966 508 495 106  
Tel : 00966 03 867 0307  
Fax : 00966 03 867 0309

Email : [salamah@salamahconsulting.com](mailto:salamah@salamahconsulting.com)

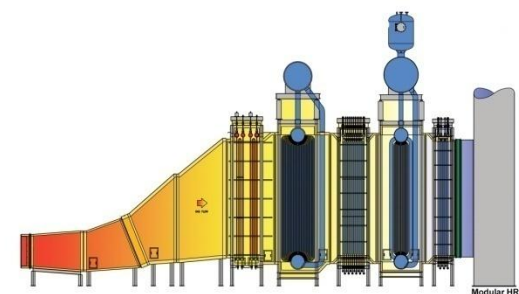
904, Al Jarbou Administrative Tower  
King Abdullah St. (Dhahran St.) & Prince Humood St.  
Al Khobar - Saudi Arabia

**www.salamahconsulting.com**

## CONTACTS

## Steam Generators and Waste Heat Boilers & HRSG's course

**April 27 to May 01, 2013**  
**Al-Khobar, Saudi Arabia**



*Learn the basics of Steam Generator, Waste heat boilers, HRSGs & Optimization of energy recovery*



**Salamah Consulting Engineering**  
YOUR NEIGHBORING ENGINEERING OFFICE

## Course outline

### First day 27 April 2013

08:00 - 16:00

#### Steam generators

Boiler basics, classification, package boilers, A,O,D types-custom designing-recent trends and advantages of completely water cooled furnaces-radiant versus convective superheaters-air heater vs. economizer for heat recovery-lowering life cycle costs through process optimization, selection of fans, material selection, specifying boilers.

#### Fuels and Combustion

Simplified combustion calculations, MM Btu method, effect of fuels, boiler efficiency calculations, ASME and simple methods, computing water and acid dew points.

#### Boiler furnaces and Circulation

Furnace evaluation, heat flux, DNB issues, Circulation systems in fire tube and water tube boilers. Acceleration loss. Gravity loss. Friction loss in two phase flow. Critical heat flux. Heat flux inside bare and finned tubes. Variables impacting circulation.

### Second day 28 April 2013

08:00 - 16:00

#### HRSG simulation

Understanding pinch and approach points, Design and off-design performance of HRSGs, Single or multiple pressure HRSG's-Examples of simulation-analyzing field data, when to go in for multiple pressure, effect of part load operation of gas turbines on HRSG's, effect of supplementary firing.

#### Waste Heat Boilers

Classification -fire tube and water tube-processes hydrogen plants, incineration plants-refineries-sulfur plants-gas turbine HRSG's-performance aspects-flue gas analysis-high and low temperature corrosion -fouling issues-unfired and fired HRSG's, single pressure vs. multiple pressure HRSGs, why finned tubes, effect of tube size, fins on surface areas, power systems.

## Course Description

The course is aimed at Engineers, Management personnel of process plants, cogen plants, chemical plants, refineries and steam plants, who are involved with performance, design, engineering, economics, trouble shooting and operation of oil/gas fired boilers, waste heat boilers and HRSGs. It highlights process heat transfer aspects, boiler design features, recent trends in design, what to look for in a good design or identify a poor design, evaluate and improve operating parameters and regimes and even ask the equipment suppliers the right questions before purchasing these equipment.

Discussions will focus on efficiency, optimizing performance, steam and metal temperatures, importance of heat flux, circulation, effect of fuels.

### Third day 29 April 2013

08:00 - 16:00

#### Heat Transfer

Heat transfer equipment design. Sizing of fire tube, water tube boilers, Coefficients affecting U in various boiler components. Performance evaluation procedures, flue gas analysis and its importance-scale and its impact on boiler performance. Non-luminous heat transfer coefficient. Inline and staggered arrangement of bare and finned tubes. Bare tube vs finned tube boilers. Effect of fins on super heater design. Inline vs staggered finned tubes. Furnace performance. off-design performance evaluation with examples simplified approach to evaluating boiler, super heater or economizer performance.

#### General calculations on boilers and auxiliaries

Boiler dynamics, Drum pressure fluctuations with load, Leakage of steam, Leakage of air/flue gases through dampers, Blow down estimation, Flash steam recovery, Flue gas density and velocity.

### Fourth day 30 April 2013

08:00 - 16:00

#### Pollution control

Health concerns, Incineration, NOx formation, NOx reduction in boilers and HRSG's, Conversion

calculations for NOx, CO, UHC and SOx. NOx control methods in boilers and HRSGs. Flue gas recirculation. SCR,SNCR systems. Emission monitoring.

### Fifth day 01 May 2013

08:00 - 16:00

#### Water chemistry

Basics of water treatment, Boiler and feed water quality, ASME and ABMA guidelines, Solubility of salts in steam, Quality and steam purity, Blow down and significance, Steam purity and importance.

#### Closure and Quiz

A quiz on steam generators and waste heat boilers. Discussion of field problems posed by participants.

## Payment Methods

#### Payment :

Payment can be made by bank transfer to Al Rajhi Bank Account No.: **375608010268388** or by a registered check payable to Salamah Consulting Engineering.

I am making a payment by Bank Transfer to your account.

I enclose a check of the full amount of \$.....

Please return the registration form by fax to : +966 3 867-0309 Alternatively contact us by e-mail at [training@salamahconsulting.com](mailto:training@salamahconsulting.com)

## Course Fee

#### Payment :

**US\$ 2600 per** delegate for the five day course including Coffee Breaks and Refreshments.(without accommodation)  
*Please Note : English will be used in all Lectures and Notes.*