

Combustion, Fired Heater Operation & Flue Gas Treatment.

Consultant/Trainer: **Louis Jacobs.**

The Petrogenium Combustion course will provide an introduction into a wide range of topics related to traditional Fired Heaters, Heat Recovery Units and Boilers. Apart from combustion theory this course will also emphasize on the specific process side of the heater as well as on treatment of flue gasses. Control & Safeguarding, efficient operation, start-up/shut-down, emergencies and maintenance/inspection are subjects covered in this course. In addition, the trainers will introduce the participants into the latest developments on burners, transition to electrical heaters and the consequences for fired heaters when moving towards Carbon Capture.

Participants

This Petrogenium course can be tailored for the specific needs of a refinery, chemical plant or LNG site. Target audience includes Technologists, HSE specialists, Senior Operators, Inspectors and C&S specialists. The course is classroom-based but can be supported by a visit in the field.

The option for post-course consultancy/help-desk support is also available.

Learning objectives

Combustion theory, Burners, Furnaces, Incinerators, Heat Recovery, Boilers, Electrical Heaters, (2-phase) flow properties, tube metal temperatures, furnace efficiency, formation of pollutants, GHG reduction, (IR-) inspection of heater tubes, control and (flame) safeguarding, operation, maintenance and inspection.

Programme

1st half day

Introduction

- *General Introduction Fired Equipment*
- *Theory of Combustion*

2nd half day

Burner designs and Environmental Aspects

- *Burner- basic features*
- *Typical burners in Petrochemical Industry*
- *Environmental Aspects*
- *Developments & future changes*

3rd half day

Fired Heaters

- *Heat Transfer modes*
- *Transfer of Heat in a Fired heater*
- *Energy losses in a Fired Heater*
- *Exercise on efficiency*

4th half day

Flow patterns in heater tubes

- *Development of 2-phase flow in heater tubes*
- *Impact of flow pattern on transfer of heat*
- *Exercise on typical 2-phase flow furnace*

5th half day

Boilers and Heat Recovery Units

- *Boilers – principle*
- *Water tube boilers*
- *Fire tube boilers*
- *Electrical boilers*
- *Heat Recovery Units*

Electrical Heaters

- *TEMA type*
- *Radiative heaters*
- *Exercise electrical heater*

6th half day

Control & Safeguarding

- *Instrument protective functions Fired Equipment*
- *Flame safeguarding*
- *Burner ignition*
- *Standards*
- *Exercise start-up*

7th half day

Inspection and Maintenance

- *Failure mechanisms*
- *Materials*
- *Corrosion*
- *Refractory*
- *Tube skin measurement*
- *IR Thermography*

8th half day

Draft control Fired Equipment

- *Boilers & HRSG's vs. Fired Heaters*
- *Stacks*
- *Natural, Forced and Balanced draft*
- *Air pre-heaters*
- *Brownfield Carbon Capture, impact on fired equipment*
- *Exercise Draft*

Course review

9/10th half day

Optional

- *Practical problems*
- *Special topics*
- *Visit Fired Equipment on site*

Contact

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