Combustion, Fired Heater Operation & Flue Gas Treatment

Consultant / Trainer:

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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

Day 1

Introduction

- Fired equipment
- Combustion theory

Burner designs & Environmental Aspects

- Burner features, typical burners
- Developments and future changes
- Environmental Aspects

Day 2

Fired heaters

- Heat transfer modes
- Transfer of Heat & Energy losses
- Exercise on efficiency

Flow patters in heater tubes

- Development of 2-phase flow
- Impact on transfer of heat
- Exercise 2-phase flow

Day 3

Boilers & heat recovery unit

- Principles
- Water, Fire & Electrical tube boilers
- Heat Recovery Units

Electrical heaters

- TEMA type and radiative heaters
- Exercise electrical heater

Day 4

Inspection & maintenance

- Failure mechanisms
- Materials, corrosion, refractory
- Tube skin measurement
- IR Thermography

Draft control on 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

Day 5

Optional

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