

Fluid Flow and Heat Transfer in Industrial Applications Training

Course Outline:

Description of Thermal Equipment

- Roles and terminology of heat exchangers, furnaces and boilers.
- **Design technology:** working principles, organization of the flows of fluids, function of the constituent parts.

Heat Transfer

- Characteristics of the modes of heat transfer. Thermal flows.
- Conduction and convection: thermal potential, resistance, thermal conductivity, convection coefficient, special case of phase changes, overall exchange coefficient, activation of heat circulation, effects of fouling.
- **Radiation:** characteristics of the emission and absorption of radiation, special case of combustion gases, application to furnaces and boilers.
- **Applications:** analysis of the conditions of heat transfer through the thermal insulation of a
- furnace, in an exchange zone.

Heat Exchangers

Heat exchange law in relation to the mode of fluids circulation: single counter-current

- exchanger, co-current, type 1-2 and 2-4 exchangers, arrangement of exchangers in series
- and in parallel.
- Special case of **condensers**, **re-boilers** and air coolers.
- **Testing and monitoring of performances:** influence of the installed exchange area and of
- fouling on heat exchanger performances.
- **Applications:** determination of the exchange area needed for a given service in relation to

- the circulation of fluids, monitoring fouling and predicting the performance of a group of heat
- exchangers.

Furnaces and Boilers

- **Working conditions and distribution** of the heat supply.
- Circulation of combustion gases, setting-up and adjustment of the draft.
- **How combustion works:** characteristics of industrial fuels, the working of burners.
- **Monitoring and testing** of combustion and firing.
- Recovery of the heat released by the burners: efficiency, possibilities for improvement and
- limits.
- **Applications:** analysis of the working conditions of a furnace, calculating its yield, study of
- heat exchanges in the radiation zone.

Training Objectives:

To provide practical and applied knowledge relating to the conditions of heat transfer and the workings of thermal equipment in the chemical and petroleum industries.