

## TC-SS04: DESIGNING AND RATING HEAT EXCHANGERS

### OBJECTIVES

Among others, the objectives of this course are to learn the thermal design, rating of heat exchangers and how to use simulation to solve real process problems. To learn the fundamentals of producing a cost optimized exchanger design. Understand the basic geometric selections required to establish a practical exchanger design. Examine process side, air side, fan selection and physical properties, and investigate thermal design principles, counter current exchangers and extended surfaces.

### PARTICIPANTS

This course is intended for process engineers who need a refresher in heat transfer theory and who occasionally can face the need to start the design of a new heat exchanger, to evaluate the performance of some existing one or to check a possible redesign.

### CONTENTS

The concepts acquired during the course will allow process engineers to incorporate heat transfer related features in their process simulation cases to solve problems in their daily design studies, improving the workflow management and reducing the project delivery time. Basing decisions on rigorous simulation results will lead to better and quicker decision-making and furthermore to improve confidence in the decisions taken.

## TWO-DAYS COURSE AGENDA

MODULE	MODULE TITLE AND SHORT DESCRIPTION	TIME	DAY
1	<b>OVERVIEW OF HEAT TRANSFER AND HEAT EXCHANGER TYPES</b> Theoretical session to show the most common and usual heat exchangers types. Common calculations in heat exchangers design and operation. Overview of the standard geometries of shell & tube heat exchangers. Description of the necessary items in a TEMA specification sheet.	3 hours	Day 1
2	<b>SINGLE-PHASE HEAT EXCHANGER</b> Instructor-led workshop showing how a single-phase heat exchanger is defined and designed in the specific heat transfer software.	2 hours	
3	<b>CONDENSING AND BOILING</b> How to take into account the fluids phase change when designing heat exchangers. Specific examples for condensers and reboilers	2 hours	
4	<b>CONSIDERING HEAT TRANSFER IN PROCESS SIMULATION</b> Generic process simulators incorporate certain simplifications and assumptions when simulating heat transfer devices. Several of this assumptions are reviewed and compared with rigorous calculations	2 hours	
5	<b>VIBRATION ANALYSIS</b> Overview of the types and causes of heat exchangers vibrations.	1 hour	
6	<b>DETAILED SIMULATION OF AN EXISTING HEAT EXCHANGER</b> Simulate an existing Heat Exchanger from its Datasheet. Use the tube layout input to correctly represent the detailed geometry.	2 hours	Day 2
7	<b>SIMULATION OF A THERMOSIPHON REBOILER</b> Thermosiphon reboilers are complex pieces of equipment that base all their behaviour on the correctness of their design. During this exercise a reboiler of this type will be simulated.	2 hours	
8	<b>DESIGN A GAS-GAS HEAT EXCHANGER</b> Design a gas-gas heat exchanger from a simulation model.	1 hour	
9	<b>AIR COOLED HEAT EXCHANGERS</b> Development of an air-cooled condenser with heat transfer software and analysis of the results obtained with them.	1 hour	
10	<b>LINKING AIR COOLED HEAT EXCHANGERS IN PROCESS SIMULATION</b> Overview of the calculations modes existing in current process simulators. Comparison with the rigorous results obtained with air cooled heat transfer software.	1 hour	