

# Simulation of Oil Refinery Plants

*Intermediate HYSYS (Steady State) course with focus on Oil Refining Applications.*

Duration: 3 days

## Objective

The course content covers the needs of process simulation intermediate users in an oil refinery working or designing environment. The use of several software functionalities will show users how to explore operating alternatives for the processing plant units that are being studied. The concepts acquired during the course will allow engineers to build their own process simulation cases to solve design problems in their daily job. Basing decisions on rigorous simulation results will lead to better and quicker decision making and furthermore improve confidence in the decisions taken

## Participants

The course is aimed at engineers who are involved in the design, control and operation of Oil Refinery facilities. Therefore the course content is also applicable for process engineers, control engineers, safety, and environmental engineers involved in roles and tasks, where process simulation is in use.

**Important Note:** Participants must be familiar with basic steady state process simulation to fully benefit from the subjects covered in this course

## Contents

The course has been designed to include many hands-on exercises to facilitate a more efficient and interesting learning experience. Theory is used to introduce the objectives of every module in the course as well as to help attendees to understand how the underlying calculations are performed:

- Oil Characterization
- Sour Water Stripper
- Naphtha Splitter
- Atmospheric tower, vacuum tower and pre-heat train
- Hydrocracker Simulation
- FCC Main Fractionator and Gas Plant
- Distillate Hydrotreater Unit

## Modules content

| Module number | Module title and short description   | Time    | Day   |
|---------------|--|---------|-------|
| 1             | <b>Oil Characterization</b><br>How to use laboratory data and analysis to define a crude oil or a final product in order to be used in the simulation case.  | 2 hours | Day 1 |
| 2             | <b>De-Isobutanizer Tower</b><br>Design of a distillation tower to separate isobutene and lighters from butane and heavier  | 1 hour  |       |
| 3             | <b>Naphtha Stabilizer</b><br>A column to stabilize a wild naphtha stream to a desired RVP is designed and modeled  | 1 hour  |       |
| 4             | <b>Sour Water Stripper</b><br>Modeling of a stripper column to reduce the ammonia content of a refinery sour water stream  | 1 hour  |       |
| 5             | <b>Naphtha Splitter</b><br>A column with a side stripper to split out the pentane components from a naphtha stream for use as an isomerization feedstock.  | 2 hours |       |
| 6             | <b>Modeling a Crude/Vacuum System with Preheat Train</b><br>The simulation model of an integrated Crude/Vacuum system with preheat train will be constructed and its performance examined.   | 4 hours | Day 2 |
| 7             | <b>Hydrocracker Simulation</b><br>An example of a typical hydrocracker unit will be modeled, consisting in the feed heating section, and approximate reactor model, the product cooling section, the high pressure separator and the recycle gas stripper.               | 3 hours |       |
| 8             | <b>Modeling an FCC Main Fractionator and Gas Plant</b><br>The model for the main fractionator column of a Fluid Catalytic Cracking unit will be modeled together with the associated gas concentration unit.   | 4 hours | Day 3 |
| 9             | <b>Modeling a Distillate Hydrotreater Unit</b><br>It is necessary to treat distillate products to remove sulfur and nitrogen compounds. This is accomplished in a hydrotreater unit where distillates are combined with large amount of hydrogen and fed to the reactor. | 3 hours |       |