SC-SS11: STEADY STATE PROCESS SIMULATION (OIL & GAS FOCUS)

OBJECTIVES

The course content covers the needs of process simulation users in an Oil & Gas 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.
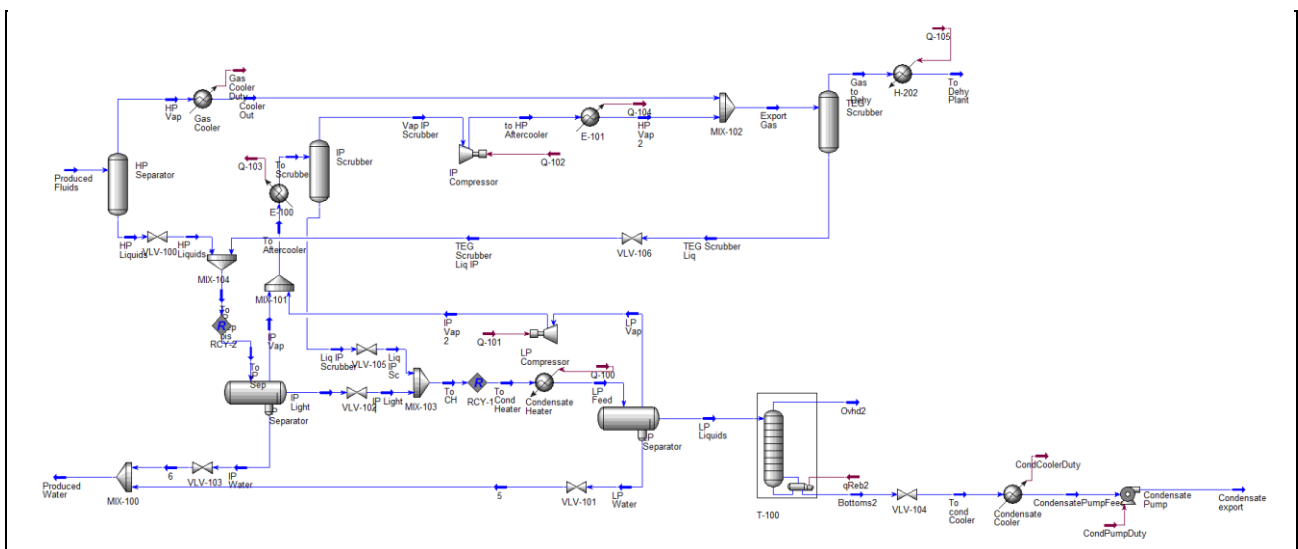
PARTICIPANTS

The course is aimed at engineers who are involved in the design, control and operation of Oil & Gas processing 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.

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.

CUSTOMIZED LEVELS

The course content can be adapted to suit an audience of engineers new to the process simulation as well as to an audience of engineers who have used the software in the past. The course agenda shown in table 5.2.5 below offers a first course day with basic content ideal for beginners. However, for more advanced users, the modules proposed for this first day, can be substituted with the modules proposed in table in point 5.2.6.

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THREE-DAYS COURSE AGENDA

MODULE	MODULE TITLE AND SHORT DESCRIPTION	TIME	DAY
1	INTRODUCTION TO THE PROCESS SIMULATOR Working with an existing case. Getting used to GUI elements. Setting-up a user preferences file. How to work with fluid streams. How to install stream utilities. How to install and connect unit operations. The Degrees Of Freedom concept.	3 hours	Day 1
2	BASIC THERMODYNAMICS Creating a new case. How to select components for a simulation: Traditional - hypothetical. The need for thermodynamic correlations and methods.	1 hour	
3	HEAT TRANSFER UNIT OPERATIONS Heaters, Coolers, Shell & Tube Heat Exchangers. Air coolers. Design calculations. Rating simulations.	2 hours	
4	DISTILLATION COLUMNS Distillation columns: How to install, define and solve distillation columns. Absorbers. Condensers and Reboilers. Column Design. Column Sizing.	2 hours	
5	PHASE ENVELOPES AND PHASE BEHAVIOUR Analysis of different phase envelopes according to fluid composition. Expected production. Expected behaviour. Influence of heavy components.	1 hour	Day 2
6	RESERVOIR FLUIDS CHARACTERIZATION Methods for oil characterization in the basis environment. Exploration of software alternatives for limited data availability.	2 hours	
7	PRODUCTION GATHERING Intensive use of the Pipe Segment to calculate separation plant inlet conditions, estimate well conditions, evaluate pressure drops and heat losses for different types of pipe insulation.	2 hours	
8	PQ CURVES SIMULATION Use of extensions to be able to simulate the evolution of wells with time due to depletion, when PQ curves are known.	2 hours	
9	HYDRATES FORMATION AND INHIBITION Use of the existing utility to evaluate the possible formation of hydrates and exploration of methods to depress them and avoid its formation.	3 hours	Day 3
10	PHASE SEPARATION AND STABILIZATION Building a separation plant to obtain the phases that constituted the inlet fluid. Liquids stabilization by distillation.	3 hours	
11	NATURAL GAS DEHYDRATION WITH TEG Construction of a dehydration plant to dehydrate a gas stream using triethylene glycol. Evaluate optimal plant operation conditions.	1 hour	

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ADDITIONAL AVAILABLE RELATED MODULES

MODULE	MODULE TITLE AND SHORT DESCRIPTION	TIME	DAY
Option	MULTISTAGE GAS COMPRESSION Rigorous simulation of a multistage gas compression unit. Determination of optimal working condition as a function of intermediate pressure values.	2 hours	
Option	REFRIGERATION LOOPS STUDIES Analysis of the effect of pressure drops in refrigeration loops. Determination of optimum intermediate pressures for economizer. Impurities effects.	2 hours	
Option	NATURAL GAS LIQUIDS EXTRACTION AND FRACTIONATION Natural Gas Liquids are extracted by LTS technology. Recovery of light hydrocarbons by successive distillation. Column Design.	3 hours	