SEPARATION EQUIPMENT – SELECTING & SIZING

TRAINIT ACADEMY

PCE110
Process and Chemical Engineering

COURSE TITLE

SEPARATION EQUIPMENT – SELECTING & SIZING

COURSE DATE/VENUE

8th – 12th Jun 26'

London, UK

COURSE REFERENCE

PCE110

COURSE DURATION

05 Days

DISCIPLINE

Process and Chemical Engineering

COURSE INTRODUCTION

This workshop covers the basic concepts and techniques necessary to design, specify and manage oil filed separation facilities. It provides a clear understanding of the equipment and processes used in common separation and oil and water treating systems as well as the selection of piping and pumping systems. The gathering, separation and final treatment systems for crude oil, before transport to refinery are discussed field and fiscal measurements error is explained. Hydrocarbon reconciliation and allocation of produced fluids to the contributing reservoirs are explained. Exercises are used to cement the learning of the various topics treated.

This workshop will enable participant to develop a "feel" for the important parameters of designing and operating oil and gas separation production facility. The participant will understand the uncertainties and assumptions inherent in designing and using the equipment in these systems and the limitations, advantages and disadvantages associated with their use.

As some of workshop participants may have no background in production facility design other than what they have learned in the introductory petroleum engineering workshops, the workshop will start with an overview explaining the goals of the oil separation facility with pictures of the equipment. Then the instructor will discuss how the equipment is put

together into a process system before explaining process calculations and equipment designing procedures.

The instructor will assign a project at the start of the workshop and have the participants take it another step forward as each day is completed. As there are many correct answers in facility process and equipment design, no two projects will be identical, but the participant should be able to defend his/her selection in an oral presentation at the last day of the workshop

COURSE OBJECTIVE

You will learn how to:

- Apply physical and thermodynamic property correlations and principles to the design and evaluation of oil production and processing facilities.
- Evaluate oil and gas separation processing configurations for different applications.
- Recognize and develop solutions to operating problems in oil production facilities.
- Attendees completing this course will enhance their understanding of process design and gain practical skills and knowledge in the design of process separators.

Solution for gas oil separation processes will be discussed as well, though at a relatively high level. In addition to the engineering aspects of oil production facilities, practical operating problems will also be covered including emulsion treatment, sand handling, dealing with wax and asphalt etc.

COURSE AUDIENCE

- Process engineers involved in the design, revamp, and operation of and related oil and gas processing plants. The program is also recommended for plant design and equipment engineers working with engineering process and equipment sizing
- Maintenance personnel who are involved in or responsible for the routine maintenance of the oil and gas separation system
- Safety engineers who are involved in the continuing assessment of oil and gas separation system as a safe means of disposal
- Environmental engineers concerned with emissions and the effect of noise and radiation on personnel.

- Newly engaged Production Engineers and Petroleum Engineers. Technical and operations staff from other disciplines, which require a cross-training to or a basic understanding of surface production operations and oil and gas separation

COURSE CONTENT

1 Introduction includes the following items:

- Fluid properties & phase behavior
- Separation Theory & Treatment System
- Data Compilation and Presentation
    - Process Flow Diagram
    - Equipment Data Sheets
    - Accuracy and Significance
- Processing configurations (example PFD's)
- Phase separation of gas, oil, and water
- Emulsions
- Sand, wax, & asphalt
- Oil treating
- Field desalting
- Crude stabilization & sweetening
- Nature of Design
- Design Constraints & codes
- Design Categories
    - New Design
    - Revamp Design

2 Separation Process

- Types and Functions, separation performance Capabilities, Accumulation, Settling

2.1 Separation by Difference in Density

2.1.1 Introduction

2.1.2 Separation Process

3 Principles of Separation

3.1 Gravity Separation

3.2 Separation System Problems

3.3 Factors Affecting Separation

4 Phases Separation

4.1 Primary Separation

4.2 Secondary Separation

4.3 Mist Extraction

4.4 Liquid Accumulation

4.5 Oil and Water Separation

5 Terminology and Applications:

5.1 Vessels Terminology

5.2 Separator Application

Slug catchers, filter separators scrubbers and knockout.

6 Stage Separations

7 Separators Classification

7.1 The Vessel Shape

7.2 The Number of Fluids to be Separated

8 Separator Internals

8.1 Inlet Configuration

8.2 Intermediate Configuration

8.3 Outlet Configuration

9 Separator Sizing

9.1 Definitions

9.2 Sizing Knock Out Drum

9.3 Sizing Liquid Accumulators

9.4 Sizing Vapor Liquid Separators

10 Separation Operations and Troubleshooting

10.1 Separator Control& relief

10.2 Troubleshooting

11 Operating Problems

11.1 Foamy Crudes

11.2 Paraffin

11.3 Sand

11.4 Emulsion

11.5 Slugging

12 Equipment Sizing, Selection and Design Process Equipment Categories:

- Proprietary Type Equipment
- Non-Proprietary Equipment
- Required vs. Calculated Data

13 Separator Vessels

- Design Considerations – Sizing, Vapor Velocity, Liquid Residence, Entrainment, Internals, Connections.
- Calculate the wall thickness and estimate the weight of the separator, Material selection.
- Vessel Calculation Method and Examples

14 Oil treating & Desalting Equipment

14.1-Oil Water Separation

14.1.1. Introduction

-Electrostatic coalescing nets

-Liquid Coalescing filters

14.2 Emulsions

14.2.1 Emulsion Terminology

14.2.2 Emulsifying Agents

14.2.3 Demulsifies

14. 3. Factors Affecting Emulsion Breakdown and its affect in Design and selecting of the vessel.

14.3.1 Differential Density

14.3.2 Viscosity

14.3.3 Interfacial Tension

14.3.4 Water Drop Size

14.3.5 Salinity of the Water

14.3.6 Volume Percent of the Water

14.3.7 Emulsifying Agents

14.3.8 Age of Emulsion

14.3.9 Agitation

COURSE CERTIFICATE

TRAINIT ACADEMY will award an internationally recognized certificate(s) for each delegate on completion of training.

COURSE FEES

£5,500 per Delegate. This rate includes participant's manual, Hand-Outs, lunch, coffee/tea on arrival, morning & afternoon of each day.

COURSE METHODOLOGY

The training course will be highly participatory and the course leader will present, guide and facilitate learning, using a range of methods including formal presentation, discussions, sector-specific case studies and exercises. Above all, the course leader will make extensive use of real-life case examples in which he has been personally involved. You will also be encouraged to raise your own questions and to share in the development of the right answers using your own analysis and experiences. Tests of multiple-choice

type will be made available on daily basis to examine the effectiveness of delivering the course.

- 30% Lectures
- 30% Workshops and work presentation
- 20% Case studies & Practical Exercises
- 10% Role Play
- 10% Videos, Software or Simulators (as applicable) & General Discussions