Distillation Control

Introduction

Distillation is the most common separation technique and is energy intensive. Distillation can consume more than 50% of a process plant's operating energy cost. A way to improve an existing plant's operating cost or to reduce a new distillation system's operating cost is to improve the efficiency and operations by correct equipment selection, process optimization and control.

Course Objective

This course will guide the participates to develop key concepts and techniques to operate, control, and troubleshoot a distillation system. After completion of the course, participants are expected to gain:

- The fundamental knowledge of distillation control.
- The operation, control and trouble shooting of a distillation columns and it's associated equipment,
- An overview of distillation, practical solutions as well as theory
- An understating of essential distillation concepts.

Who should attend

Managers, operators, facilities engineers, operating engineers, supervisory personnel, maintenance and technical personnel involved in the day to day operations of distillation processes.

Course Content

1. **Strategy for Distillation-Column Control**
    - 1.1 Distillation Control Objectives
    - 1.2 Arrangements for Material-Balance Control
    - 1.3 Fundamentals of Composition Control
    - 1.4 Compensation for Various Disturbances
    - 1.5 Start-up and Shutdown
    - 1.6 Control System Design Philosophy
    - 1.7 Procedure for Overall Control System Design
    - 1.8 Column Design Philosophy and Control System Design
    - 1.9 Existing Columns—Typical Practices and Troubleshooting
2. **Fundamentals of Distillation**
    - 2.1 Introduction
    - 2.2 Tray Hydraulics
    - 2.3 Vapour—Liquid Equilibrium Fundamentals
    - 2.4 Graphical Solution Techniques
    - 2.5 Effects of Variables

8. Minimizing Energy Requirements

8.1 Introduction
8.2 Conservation
8.3 Design Considerations in Heat-Recovery Schemes
8.4 Multiple Loads Supplied by a Single Source
8.5 Single Source, Single Load
8.6 Split Feed Columns
8.7 Combined Sensible and Latent Heat Recovery
8.8 Energy Recovery by Vapour Recompression

9. Application of Protective Controls to Distillation Columns

9.1 Introduction
9.2 Overrides and Interlocks
9.3 Implementation of Overrides
9.4 Controllers in Override Circuits
9.5 Anti Reset-Windup
9.6 Feed forward Compensation with Overrides
9.7 Overrides for Column Overhead System
9.8 Overrides for Column-Base System
9.9 Automatic Start-up and Shutdown
9.10 "Idle" or Total Reflux
9.11 Miscellaneous Overrides
9.12 Design Considerations
9.13 Overrides for Side-Draw Columns

10. Indirect Composition Measurements

10.1 Introduction
10.2 Single-Tray Temperature
10.3 Differential Temperature
10.4 Differential Vapour Pressure
10.5 Pressure-Compensated Temperature
10.6 Multicomponent Compositions Computed from Temperature and Pressure Measurements
10.7 Double-Differential Temperature
10.8 Average Temperature
10.9 Composition Estimators

11. Miscellaneous Measurements and Controls

11.1 Introduction
11.2 Calculation of Distillation-Column Internal Reflux
11.3 Temperature and Pressure Compensation of Gas Flow Meters
11.4 Heat-Flow Computations
11.5 Column-Base Level Measurements
11.6 Control Valves
11.7 Column LP Measurement
11.8 Temperature-Measurement Dynamics
11.9 Flow and Flow-Ratio Conventions
11.10 Control-Valve Split Ranging

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