



## Distillation & Troubleshooting

**Potential PDH:** 16

### Description:

Using distillation and binary tower operation as the learning vehicle, the engineer becomes familiar with the process parameters and relationships important to proper tower operation. In this context, a methodology is built and employed which allows the engineer to understand those situations which have been previously observed – and to systematically take apart those situations which have not been seen before. This step-wise approach to unraveling the unknown – troubleshooting – will be useful and can be employed in any context: in process situations, operations, or even general problem-solving.

### Outline:

- A. Distillation
  - 1. Chemistry
    - Distillation
    - Range of Boiling Points
  - 2. Distillation Concept
    - Quality of Separation/Recovery
    - Liquid to Vapor Ratio in Tower
    - Tray Loading
  - 3. Control Objectives
    - Maximize Recovery
  - 4. Malfunctions
    - Flooding
    - Blowing
    - Weeping
    - Fouling
  - 5. Constrains
    - Pressure Differential (Drop)
    - Condenser Outlet Temperature
    - Reboiler (or Furnace) Capacity
  - 6. Distillation Control Relations
    - Bottom Temperature Control
      - Bottom Temperature



- Reflux
    - Pressure
    - Feed Composition
  - Bottom Temperature Control Matrix
  - Analyzer Control
    - Bottom Temperature
    - Analyzer
    - Pressure
    - Feed Composition
  - Analyzer Control Matrix
  - Steam to Feed Ratio Control
    - Steam to Feed Ratio
    - Overhead Temperature
    - Pressure
    - Feed Composition
  - Steam to Feed Ratio Control Matrix
  - Dual Temperature Control
    - Bottom Temperature
    - Overhead Temperature
    - Pressure
    - Feed Composition
  - Dual Temperature Control Matrix
- B. Troubleshooting



### Subject Matter Expert (SME):

**Michael (Mike)Bober** holds a BS in Chemical Engineering from the New Jersey Institute of Technology. He served as a Process Engineer, Project Developer, Economist, and Manager at Exxon's Bayway Refinery for twelve years. He then joined Mobil Research and Development as an FCC Specialist. He managed technical training for Engineering, worldwide, until Exxon and Mobil merged in 2000. At this point, he managed worldwide technical training for ExxonMobil Research and Engineering and then retired from managing the Technical Portfolio for ExxonMobil's Global Manufacturing Training initiative – with a combined service of 37 years to the two companies.