Day 1: The Process Engineer and Core Process Documents

Morning Session – Role and Workflow of the Process Engineer

Topics:

- Role of the **Process Engineer** in a Technology & Engineering Company
- Differences with respect to
  - Product / Technology Engineer
  - Refinery / Plant Operation Technician
  - Mechanical, Piping, I&C, Safety discipline
- The **project phases**:
  - Concept → Feasibility → Basic Engineering → Detail Engineering → Construction → Start-up

Afternoon Session – Typical Process Documentation (Part 1)

Topics:

- Process Flow Diagram (**PFD**)
  - Design intent, boundaries, and typical mistakes
- Heat & Material Balance (**HMB**)
  - Stream definition, closure, reconciliation
- Utilities & Consumption Summary (**UCS**)
  - Steam, cooling water, electricity, BFW, fuels
- Emissions & Effluents List
  - Environmental relevance and reporting logic

Learning outcomes

- Understand responsibilities and decision-making power of a process engineer
- Workflow: how an information travels in the engineering documentation
- Reading and interpreting typical documentation for a Process Design Package (PDP)
- Identification of missing or inconsistent data

Day 2: From Process Design to Physical Plant

Morning Session – Typical Process Documentation (Part 2)

Topics:

- Equipment **Datasheets**
  - Purpose, key inputs, process responsibility
- Piping & Instrumentation Diagrams (**P&IDs**)
  - Tagging logic, line classes, control philosophies
- **Safety** and **Automation** Concepts
  - Basic control vs safeguards
  - Introduction to interlocks, alarms, SIL concept

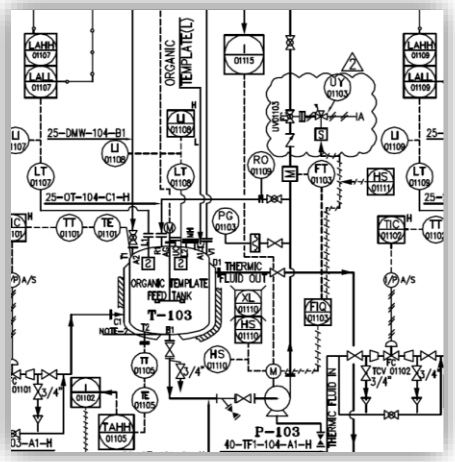
Afternoon Session – Training Session 1: Pressure Drops & Line Sizing

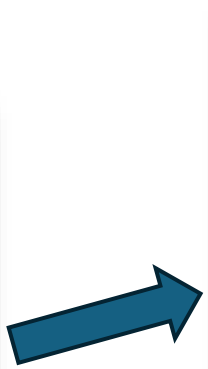
Topics:

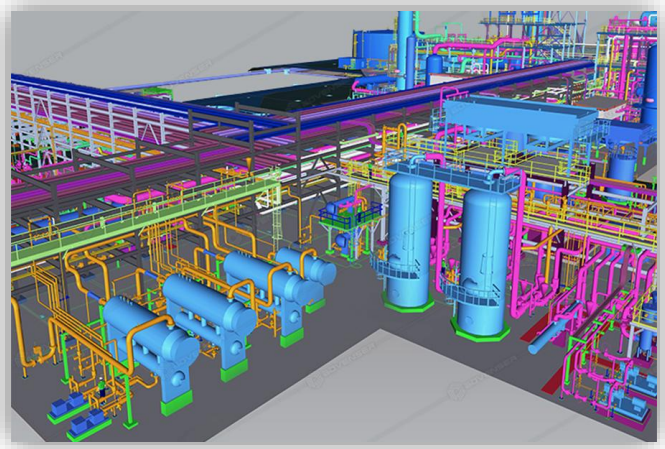
- Pressure drop fundamentals (liquid / gas)
  - Flow velocity criteria
  - Line sizing philosophy
  - Nominal diameter and pipe schedule
- Managing **international standards**
- From calculation to realization
  - **3D model** integration
  - Material Take-Off (**MTO**)

Learning outcomes

- Ability to read and comment a P&ID from a process standpoint
- Understanding what a process engineer owns vs reviews
- Pipe sizing calculation







Day 3: Control and Dynamic Behavior

Morning Session – Training Session 2: Control Valves

Topics:

- Control valve role in process operability
- **Cv** concept and sizing philosophy
- Valve **types** and **selection** criteria
- Typical mistakes in control valve specification

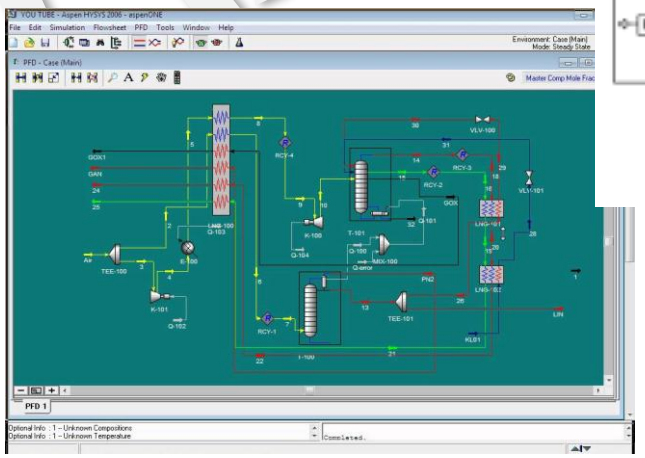
Learning outcomes

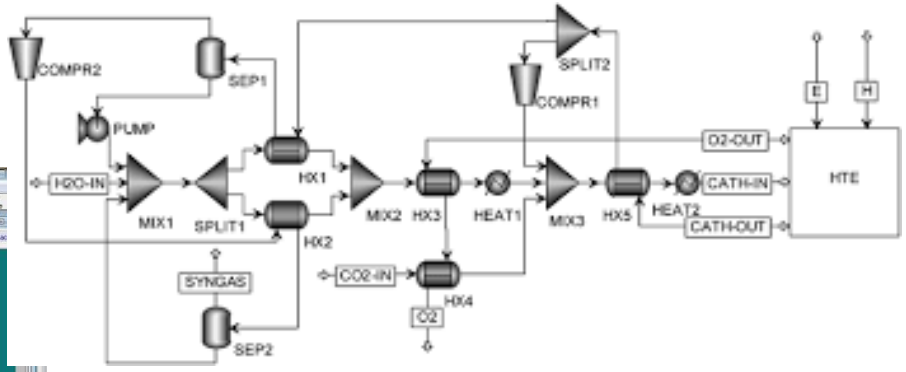
- Control valve sizing exercise
- Building a simple flowsheet
- Sensitivity analysis on key variables

Afternoon Session – Simulation Tools: General Approach

Topics:

- Purpose of steady-state simulation
- Degrees of freedom and convergence logic
- Thermodynamic package selection
- Validation of simulation results vs engineering judgment
- Overview on different process simulation tools





Day 4: Process Safety and Integrated Case Study

Morning Session – Training Session 3: Pressure Relief Devices

Topics:

- **Overpressure** scenarios
- Relief philosophy (**PSV**, rupture disks)
- Introduction to **API** relief concepts
- Common design pitfalls

Learning outcomes

- Preliminary PSV sizing for standard scenarios
- CO_2 capture case study simulation
- Identification of critical operating variables

Afternoon Session – Simulation Tools: Case Study 1

Carbon Capture

Topics:

- Carbon Capture process overview
- Simulation of a typical carbon capture unit
- Link between simulation, PFD, and equipment data
- Sensitivity analysis

Day 5: Advanced Equipment Design and Synthesis

Morning Session – Training Session 4: KO Drums

Topics:

- Knock-Out drum function
- Sizing criteria (liquid handling, gas velocity)
- How to transfer calculations into an equipment datasheet
- Interaction with mechanical design

Learning outcomes

- KO drum sizing exercise
- Completion of a process equipment datasheet
- Steady-state simulation of synthesis loop
- Sensitivity on pressure and purge rate

Afternoon Session – Simulation Tools: Case Study 2

Ammonia Synthesis

Topics:

- Ammonia synthesis loop overview
- Recycle, purge, and compressor effects
- Simulation of a typical ammonia synthesis loop
- Process integration challenges