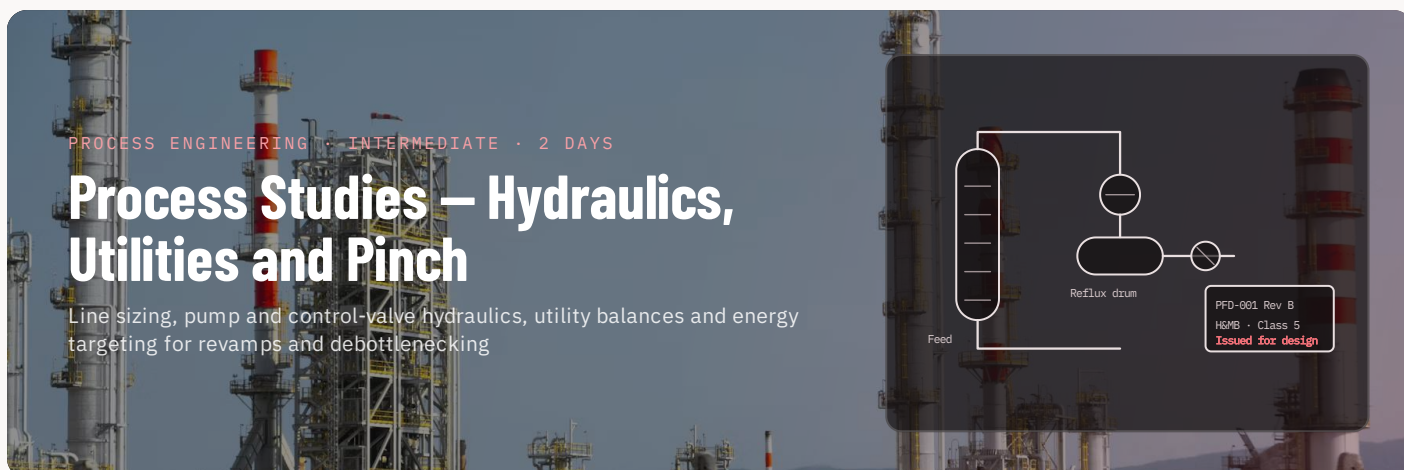




DURATION
2 days

LEVEL
Intermediate

FORMAT
On-site classroom · virtual instructor-led

LANGUAGE
English

MAX. PARTICIPANTS
16

3

hydraulic networks solved by hand and by software

1

pinch analysis on a real unit

1

utility balance workshop

◆ Overview

Most capacity and energy questions on an existing unit come down to a hydraulic calculation and a heat balance done properly. The course covers single-phase and two-phase line hydraulics, pump and control-valve system curves, steam and cooling-water balances and pinch analysis, always with the question of which constraint actually limits the unit. Exercises are worked by hand first so that software results can be checked.

◆ Learning outcomes

- Size lines for liquid, gas and two-phase service using velocity, pressure-drop and erosion criteria
- Build a system curve, check NPSHa and control-valve authority, and find the true bottleneck
- Calculate steam, condensate, cooling-water and fuel balances and identify imbalances and losses
- Apply pinch analysis to set energy targets and screen heat-exchanger network modifications
- Structure a debottlenecking study from data gathering to option ranking
- Present hydraulic and energy results in a form that project and operations can act on

◆ Who should attend

Process engineers performing operability, revamp and energy studies; plant engineers investigating capacity limits

◆ Course outline

DAY 1

Line sizing criteria: velocity, pressure drop, erosional velocity (API RP 14E / ISO 13703) · friction factor and fittings (Crane TP-410) · compressible and two-phase flow methods · pump system curves, NPSH and control-valve authority · network solution and worked hydraulic cases · flare header and vent hydraulics overview

DAY 2

Steam, condensate and BFW balances · cooling water and fuel balance · utility losses and unaccounted-for streams · pinch analysis: composite curves, targets, cross-pinch heat transfer · HEN retrofit screening · debottlenecking study structure and option ranking · workshop on a participant unit

◆ Standards referenced

API RP 14E / ISO 13703

Crane TP-410

GPSA Engineering Data Book

ASME B31.3

API 521

◆ Tools & exercises

Hand calculations and the client's simulator or hydraulic package of choice

◆ What's included

- ✓ Course manual and slide pack
- ✓ Software access for the course
- ✓ Post-course Q&A with the instructor
- ✓ Exercise and case-study pack
- ✓ Competency quiz and certificate
- ✓ Templates used in the exercises

PREREQUISITES

Chemical engineering degree; basic fluid mechanics

CERTIFICATION

Certificate of completion

INSTRUCTORS

Practising engineers — TÜV HAZOP Leader, CCPSC and IEC 61511 Functional Safety certified — with 200+ years of cumulative plant experience.

Book this course or build a custom curriculum

On-site at your plant or virtual · in-house groups · competency assessment included

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