"We Deliver Knowledge, Training, and Consulting for Chemical and Mechanical Engineers"

PE01: Fluid Flow and Hydraulic Analysis for Engineers

Chemical and mechanical engineers often have to deal with fluid flow and hydraulic analysis in their projects and technical works. Unfortunately, most people do it incorrectly or without sufficient knowledge, resulting in undersizing and/or oversizing of lines and components in the hydraulic systems, which subsequently lead to problems in operations. The problem with existing training courses is that they focus only on line pressure drop, but fails to address the effects of many important components such as fittings, control valves, pumps, compressors, heat transfer equipment, and instruments. The course will show real examples of hydraulic analysis calculations, thus making it very practical and useful for practicing design engineers.

Target Group: Engineers e.g. chemical engineers and mechanical engineers, process design engineers, process engineers, engineering company engineers, any technical people dealing with fluid flow and hydraulic analysis.

Date: Check upcoming dates in www.chemengedu.com

Time: 9:00-17:00

Price & Promotions: See rate, early-bird rate and promotions in chemengedu.com

Venue: Check venue in www.chemengedu.com

Registration: By training registration page in www.chemengedu.com or contact Khun Piyarat +66-(0)-89-118-6531, email: chemengedu.training@gmail.com

******ใบเสร็จรับเงินตัวจริงจะส่งมอบในวันอบรมจริงครับ **Original receipts will be provided on the day of training course.**

Course Outline:

I. Key Concepts of Fluid Flow and Hydraulic Analysis for Design Engineers

- Types of Fluid Flow
- Bernoulli's equation for fluid flow
- Velocity Head, Static Head Losses, Frictional Losses
- Moody chart
- Friction factor
- Fanning friction factor
- Incompressible Flow (Liquid) Pressure Drop
- Compressible Flow (Vapor) Pressure Drop
  - Fundamentals of compressible fluid flow: adiabatic vs. isothermal
- Equivalent Length Concept
- Losses through valves and fitting (minor losses)
- Line Sizing Criteria - Typical Design Velocities and Pressure Drop per Length: 1. Gravity flow; 2. Pump & compressor suctions; 3. Pump & compressor discharges; 4. Reboiler; 5. Column overhead vapor & condenser loop; 6. Liquid at bubble point; 7. Steam condensate; 8. Heater transfer line; 9. Cooling water; 10. Make-up gas to a hydrogen user unit; 11. Static electricity consideration; 12. Relief valves
- Problem Solving by Prorating Pressure Drops
- Critical (Sonic) Flow
- Orifice Calculations
- Two-Phase Flow: Basic Concepts and Flow Regimes of Vapor-Liquid Systems
- Process Pressure Profile in Preliminary Hydraulic Analysis
- Parallel Pipeline Flow Splits

II. Hydraulic Analysis With Common Components and Specific Fluids

- Hydraulic Analysis with Pumps and Control Valves
- Control Valve Sizing and Pressure Drop Basis
- Flow Element Pressure Losses
- Vessel Nozzles & Restriction Orifices
- Column Bottoms Hydraulics with Reboilers
- Pump NPSH Available and Required
- Fire Water Pipe sizing by Hazen-Williams Equation
- Steam Line Sizing by Unwin's Formula

III. Learn Real Calculation Using Industrial Examples

Your Instructor:
Mr. Wiroon Tanthapanichakoon, Senior licensed chemical engineer in Thailand, license no. 155

Qualifications:

- Technology Director and Technical Advisory Board Member of Global R&D Co. Ltd.
- Bachelor and Master degrees in Chemical Engineering from Kyoto University, Japan
- >10-year experience in a refinery of a global oil company and an ethylene plant of a leading Thai petrochemical company with direct experience in process and equipment design
- 1-year work experience in USA in a technology team of a well-known US technology licensor, GTC Technology US LLC
- A member of Elsevier Editorial Board in Process and Plant Design (2014-2015) and an advisory board member of International Association of Certified Practicing Engineers (IACPE) (2015-2016)
- A Senior Member of American Institute of Chemical Engineers (AIChE)
- Invited lecturers and instructors for various technical seminars for > 1500+ engineers from 80+ organizations in Thailand including companies and universities
- One of the first Thai chemical engineers to have published articles in 3 renowned chemical engineering monthly magazines in the US – i.e. *Chemical Engineering Progress* (by AIChE), *Chemical Engineering* Magazine, *Hydrocarbon Processing*
- Holds several papers on Sciencedirect and technology patents
- Presented papers at AIChE 2006 Fall Meeting and was the first engineer of his Thai leading company to present technical knowledge at AIChE 2015 Spring Meeting: Ethylene Producers' Conference

Technical Publications

1) Wiroon T., "Saving Energy in Multi-Level Steam Systems", Jan 2012, AIChE Chemical Engineering Progress (CEP) magazine
2) Kongkiat S., Wiroon T. et. al., One patent granted in China, ZL 2009801631658 PROCESS FOR REDUCING THE BROMINE INDEX OF A HYDROCARBON, published date: December 24, 2014
3) Wiroon T., "Accelerating Process and Product Development", Feb 2013, Chemical Engineering (ChE) magazine (US)
4) Wiroon T., Grittaya S., "Unlocking the Secrets of Plate-and-Frame Heat Exchangers", May 2014, Chemical Engineering (ChE) magazine (US)
5) Wiroon T. et al., "Analysis and Optimization of High-Emissivity Coil Inserts to Improve Overall Coil Heat Transfer at Lower Pressure Drop and Shorter Residence Time in Ethylene Furnaces", submitted paper orally presented in AIChE 2015 Spring Meeting, 27th Ethylene Producers' Conference.
6) Wiroon T., Kongkiat S., "Solve On-line Analyzer Time Delays by Improving Sampling System Design", Jan 2016, Hydrocarbon Processing Magazine (US).
7) Wiroon T. et. al., "Design of Mixing in Microfluidic Slugs based on a New Dimensionless Number for Precise Mixing and Reaction Operations," 2006, Chem. Eng. Sci., Vol. 61 Issue 13, 4220-4232
8) Wiroon T. et. al., "Design of Microfluidic Liquid Slug Mixing based on a Dimensionless Mixing Rate and a Modified Peclet Number," 2006, Chem. Eng. Sci., Vol. 61 Issue, Vol. 61 Issue 22, 7386-7392
9) Matsuyama K., Wiroon T., et. al., "Operation of Microfluidic liquid slug formation and slug design for kinetics measurement," 2007, Chem. Eng. Sci., Vol. 62 Issue 18-20, 5133-5136
10) Wiroon T., "Study, Research, Work Experiences", SCEJ Magazine Japan, Jan 2017
11) Process for enhanced separation of ethylbenzene, European Patent, WO 2016036392 A1

Invited Lecturer or Course Instructors

1) Mass Transfer and Mass Transfer Devices Scale-Up (Nov'10, SCG Chemicals)
2) Accelerating Process and Product Development (Jul'12, GTC Technology)
3) Process Design and Optimization, Distillation Design, Heat Transfer and Heat Exchanger Design, Heat Integration, Basic Costing, and Steps After Basic Process Design (Jan-Feb'13, Naresuan)
4) Chemical Process Scale-Up (Jun'13, Chulalongkorn)
5) Process Plant Design Course (Oct-Dec'13, Naresuan)
6) Fixed-Bed Reactor Scale-Up Seminar (Aug'14, Chulalongkorn)
7) Process Innovation and Process Engineering from the Industrial Point of View (Sep'14, KMITL Ladkrabang)
8) Fluid Flow and Hydraulics (Jan'15, SCG Academy)
9) Fixed-Bed Reactor Design and Scale-Up (Mar'15, Chulalongkorn)
10) Fixed-Bed Reactor Design and Engineering (Aug'15, SCG Academy)
11) Technical Writing & Presentation for Professionals (Mar'16, Technology Promotion Association)
12) Scale-Up in Chemical Engineering (Feb'16, VISTEC)
13) Wiroon T. et al., "Analysis and Optimization of High-Emissivity Coil Inserts to Improve Overall Coil Heat Transfer", 2015 AIChE 27th Ethylene Producers' Conference.
14) "High Throughput Reactors", Singapore Catalyst Society Conference (May'16)
15) "Presentation and Writing Skills", Grand Siam Composite (Feb'16)
16) PE04: What Engineers Should Understand to Develop Correct PFD, P&ID, and Piping Engineering Specifications, ChemEngEdu (May'16)
17) Presentation Skills, CUEL Co. Ltd. (Jun'16)
18) GC01: Professional Presentation and Writing Skills (Aug'16)
19) PE07: Basic Design and Process Engineering Skills for Engineers (Sep'16)
20) PE04: P&ID and Piping Engineering Specifications (SCG Chem, Sep'16)
21) Professional Presentation and Writing Skills (TPA, Sep'16)
22) PE01: Fluid Flow and Hydraulic Analysis (Oct'16)
23) PE07: Basic Design and Process Engineering Skills for Engineers (Sep'16)
24) High Impact Presentation and Writing Skills (Nov'16, MJ Swagelok)
25) Lab Research to Innovation Business (Nov'16, NIA)
26) PE04: P&ID and Piping Engineering Specifications (Nov'16)
27) PE12: Polymer Extrusion and Compounding Technology (Nov'16)
28) PE11: Fluid Mixing and Agitated Tank Reactor Design & Scale-Up (Jan'17)
29) "Creating Impacts from Scale-Up" (Feb'17, PACCON)
30) Shell-and-Tube Heat Exchanger Design, Specification, Sizing (Feb'17)
31) PE07: Basic Design and Process Engineering Skills for Engineers (Mar'17)
32) GC01: High-Impact Technical Journal Writing (SCG, Mar'17)
33) PE04: P&ID and Piping Engineering Specifications (Apr'17)
34) PE13: Process Operation & Engineering Problem Solving (Apr'17)
35) PE02: Fixed Bed Reactor Design, Engineering, and Scale-Up (VISTEC, May'17)
36) Scale Up Process to Create Tangible Impact from Commercialization (PETROMAT, May'17)
37) Applying Thermodynamic Knowledge to Real-World Problem Solving (Mar'16, KMUTNB)
38) Essential Excel Spreadsheet Skills for Chemical Process Engineers (Apr'16, KMUTNB)
39) CU Process Design and PFD-P&ID Course (Jun'17)
40) E851B: PFD-P&ID-Piping Engineering Specs (Jul'17)
41) Scale-Up to Make Tangible Impacts from Research (Jul'17, TRF Congress)
42) GE01: Capital and Operation Cost Estimation (Sep'17)
43) Process Scale-Up Course (PTTGC, Sep'17)
44) Fluid Mixing Design and Scale-Up (PTTGC, Oct'17)
45) PE13: Process Operation & Engineering Problem Solving (Oct'17)

46) PE12: Polymer Extrusion and Compounding Technology (Oct'17)
47) PE07: Basic Design and Process Engineering Skills for Engineers (Nov'17)
48) PE01: Fluid Flow and Hydraulic Analysis (Nov'17)
49) PE17: Process Integration and Pinch Analysis (Nov'17)
50) PE04: P&ID and Piping Engineering Specifications (Dec'17)
51) EXXX: Fluid Flow and Hydraulic Analysis (Dec'17, PTTGC)
52) E851B: P&ID and Piping Engineering Specifications (Dec'17, BANGCHAK)

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