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# **PRACTICAL DISTILLATION TECHNOLOGY**

***With Special Emphasis on Troubleshooting Techniques***



taught by

**HENRY Z. KISTER**

**Fluor**

**Lecturer and Author For This Same Seminar  
As Taught Internationally  
For Seminars & Conferences Group  
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# **PRACTICAL DISTILLATION TECHNOLOGY**

**MARCH 5 - 7, 2012  
HOUSTON, TEXAS**

**Available In-Plant, See Back Cover**

## **At This Seminar You Will Learn How To...**

- Troubleshoot a distillation column and determine what may cause poor performance
- Evaluate existing column performance and develop new designs
- Avoid common causes of capacity bottlenecks, tray damage, downcomer sealing problems, packed tower distributor malfunctions and many other operating difficulties
- De-bottleneck a column to improve capacity and/or separation
- Control and operate a distillation column
- Validate your tower simulation

## **Special Feature of This Program ...**

In addition to the program manual, every attendee will receive a copy of the *Distillation Operation* and *Distillation Troubleshooting* textbooks. Each attendee will also receive a copy of *Perry's Section 14 Handbook*.

This material will be an invaluable reference source.

## **AVOIDING FRACTIONATION PITFALLS**

Vapor-liquid equilibrium (VLE): key concepts and simulation traps. Should we believe the simulation? Issues with close-boilers and non-idealities: why some heavy components go up while the simulation thinks they go down. VLE data: to trust or not to trust? Are distillation trays ideal stages? Reflux-stages relationship. Multi-component distillation: composition profiles, side-draws, accumulation, and cycling problems. What you need to watch out for.

## **TROUBLESHOOTING DISTILLATION SIMULATIONS**

Does your simulation reflect the real world? How poor simulation leads to incorrect problem diagnosis. What validation checks are needed? How far should we go? Sensitivity analysis and graphics for simulation troubleshooting: useful hints.

## **TRAY HYDRAULICS & LIMITS**

Visualization of vapor-liquid dispersions on trays, flooding, entrainment, weeping, dumping. Flood mechanisms: jet (entrainment), system limit, downcomer backup, downcomer choke. Which one limits your tower capacity? Common tray types: sieve, moving valve, fixed valve, sheds: pros and cons. Which works well in fouling applications? Small holes, valves: benefits and traps. Flood: what causes it, what affects it, and how predicted. Are the predictions reliable? Tray efficiency: are simulation predictions reliable? Can it be enhanced by tray modification?

## **TROUBLESHOOTING TRAY TOWERS**

Gamma scans: application for diagnosing flood, missing and damaged trays, foaming, and downcomer flooding. How to combine gamma scans with process checks to get the most out of the scans: the four keys to success. Do gamma scans ever lie? Flooding and foaming symptoms: high dP's, reduced bottoms, others. Which can be trusted? Liquid and vapor sensitivity field tests: identifying the correct flood mechanism. Downcomer unsealing and tray dryout: when would they affect your tower and how prevented.

## **TROUBLESHOOTING PACKED TOWERS**

Rules of thumb for flood pressure drop and packing efficiency. Simulation hydraulic calculations: to trust or not to trust? Grid gamma scanning for detecting maldistribution, damage, distributor malfunction, distributor and collector overflow. Distributor overflow: DEATH for packed beds. Some do's and don'ts for distributors. Can poor distributor feeding bottleneck towers? Circumferential surface temperature surveys: how to conduct, what to avoid, and the hidden secrets they reveal.

## **DEBOTTLENECKING**

State-of-the-art trays & packings: strengths and weaknesses. Factors that favor trays and factors that favor packings. The pressure drop bonanza: why packings win in non-fouling vacuum services and in compressor suction. Pitfalls unique to structured packings: high pressure application, oxidation, shutdown fires. High-capacity trays (e.g. Superfrac, VG Plus, MD): principles, tricks, and traps. Do they really give 30% more capacity than conventionals?

# ***Your answer to increasing operating efficiency, reducing costs, and promoting trouble-free column operations***

## **DISTILLATION CONTROL**

Assembling control loops into an overall scheme: what works, which is better, what causes instability, and what impairs efficiency. The 3 most common causes of control assembly failure: no material balance control, fighting between temperature controllers, and level control on a small stream. Tips for avoiding problems. Can controls affect revamp success? Best temperature control location: is there a reliable method for finding? How can a temperature controller be fooled? Reboiler, condenser, and pressure controls: which loops work and which misbehave. How dead pockets in vapor overhead lines interfere with controls. Understanding hot vapor bypasses: why some work while others don't. Control systems that did not work.

## **AVOIDING TOWER MALFUNCTIONS**

The 20 most common causes of distillation malfunctions: what trouble should we look for and prevent. Points of transition (feeds, draws, tower base): why these are some of the worst tower bottlenecks: how diagnosed and remedied. High tower base levels: how

they induce premature flood, even tray/packing damage, and how you can prevent. Instrument issues at the tower base: what to watch out for. Tray/packing damage: pressure surges due to water entering a tower full of hot oil or insoluble organics, other sources of tray damage and ways to avoid. Some commissioning and startup watchouts: pre-startup inspection, blinding and unblinding, reverse flow, steam-water operation, washing, rapid pressuring/depressuring, drawing vacuum, introducing liquid. Chimney trays: do's, don'ts, and how they bottleneck towers. Liquid outlets: choking in sidedraw rundown lines and how it restricts tower capacity. Why must self-venting flow be assured in the presence of entrained vapor? Siphon formation. Kettle and once-through thermosiphon reboilers: how they bottleneck towers.

## **Case Studies**

These operating experiences will be scattered throughout to illustrate the key principles and to distinguish good from bad practices.

## **OPTIONAL HALF DAY SESSION SPECIAL REFINERY CONSIDERATIONS**

### ***(Begins Immediately After Lunch On The Last Day)***

Debottlenecking refinery fractionators: which sections need modifications? Some simple schemes that effectively raised capacity. Mass and heat balance troubleshooting: how these detect insufficient wash, overflows. Checking sprays: plugged? broken? Leak/overflow/excess weep detection: the symptom of low temperature while making more heavy distillate. Simple tests that teach a lot about the nature of the bottleneck.

Vacuum crude towers: how much wash keeps packing wet? How poor flash zone simulation can lead to wash zone coking. True vs. measured overflash: what is worthless wash? Can tall or efficient wash beds impair capacity or lead to coking?

## **The Seminar Leader**

HENRY Z. KISTER is a highly recognized specialist with over 25 years of vast expertise in all phases of distillation, including troubleshooting, operation, design, start-up, and control. As a director of fractionation technology at Fluor, he designs, revamps and advises on distillation processes, equipment, and controls for the chemical, petrochemical and oil industries. He is also extensively involved in field consulting, start-up and troubleshooting. He is Fluor's representative on the Fractionation Research Inc. (FRI) Advisory Committee and serves on FRI's Design Practices Committee.

Before joining Fluor in 1999, he was Brown & Root's staff consultant on fractionation. He provided clients for over 17 years with designs, debottlenecks, troubleshooting expertise and field assistance on fractionation and absorption technology. Before that, he was with FRI, where he specialized in fractionator hydraulics. Prior to that, he was with ICI Australia Ltd., where his duties included start-up supervision, operation, debottlenecking, process and hydraulic design, troubleshooting, and commissioning of several distillation systems.

He is the author of over 80 published technical articles on distillation, and two textbooks titled, *Distillation Operation* and *Distillation Design*, both published by McGraw-Hill. He is also the author of the textbook, *Distillation Troubleshooting*, published by Wiley.

Henry Kister has conducted over 300 "Practical Distillation Technology" programs for major corporations in the U.S., Canada and overseas.

## REGISTRATION INFORMATION

**PROGRAM:** Hours are 8:00 a.m. to 5:00 p.m. each day. Should the program be cancelled for any reason we will make every effort to notify all attendees and our liability will be limited to the return of the registration fee.

If you desire more information about this session, please call Lorraine Castiglia, Director, Seminars & Conferences Group at (732) 617-8246 or Email:lorrainec@semconfs.com

**FEES:** Please check appropriate box below:

**2½ Days**                       **3 Days**  
 \$ 1,535                               \$ 1,685

The fee payable in US dollars includes the program manual, two textbooks, handbook, breakfast buffet, beverage breaks and luncheon buffet each day. These luncheons will be an additional opportunity to exchange ideas with other attendees and ask special questions of the seminar leader.

**ACCOMMODATIONS:** The program will be held at the Hotel Derek 713-961-3000. A block of sleeping rooms have been reserved at this hotel. All information will be included with your confirmation letter.

**REFUND POLICY:** You will receive a full refund if your registration is cancelled seven business days prior to the program. Cancellations received after that date are subject to a service charge of \$100. In fairness to all attendees, confirmed registrants who do not attend or cancel three business days prior to the program are liable for the entire fee. If you are unable to attend a program, call us to substitute another person in your place without penalty. Substitutions may be made at any time.

**IN-PLANT TRAINING:** Bringing this special program, (and others) to your site, can save your company money plus offer other significant benefits. For detailed information, please contact Lorraine Castiglia, Director, at 732-617-8246, e-mail:lorrainec@semconfs.com

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#### FIVE EASY WAYS TO REGISTER:

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| 1. <b>CALL</b> Cathy Evans<br>at 1(800) 832-4563<br>or (732) 617-8244 | 2. <b>FAX</b> to her at:<br>(732) 617-8406 | 3. <b>E-MAIL:</b> cathy@semconfs.com<br>4. <b>ONLINE:</b> www.semconfs.com<br>5. <b>MAIL</b> to her: Seminars & Conferences Group Int'l., L.L.C.<br>400 Bridge Plaza Drive, Englishtown, NJ 07726-1735 |
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**REGISTRATION FORM** *(please return entire page)*  
**Practical Distillation Technology - March 5 - 7, 2012 - Houston, Texas**

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