



PE030: Practical Distillation Technology





Training Description:

This intensive course gives comprehensive coverage of distillation technology with particular emphasis on the problems that occur and how to solve them. It provides an excellent opportunity to develop a working knowledge of key techniques that can promote trouble-free operation and reduce distillation cost.

Training Objectives:

By the end of the training, participants will be able to:

- ✓ How to troubleshoot a distillation column and determine what may cause poor performance
- ✓ How to evaluate existing column performance and develop new designs
- ✓ How to avoid common causes of capacity bottlenecks, tray damage, down comer sealing problems, packed tower distributor malfunctions and many other operating difficulties
- ✓ How to de-bottleneck a column to improve capacity and/or separation
- ✓ How to control and operate a distillation column
- ✓ How to validate your tower simulation

Training Designed for:

This course is intended for all engineering and supervisory personnel who are involved in operating, troubleshooting, de-bottlenecking, designing and starting up distillation processes.

Training Program:

DAY ONE:

- ❖ Pre-Test
- ❖ Avoiding Fractionation Pitfalls
 - Vapour-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.

DAY TWO:

- ❖ Tray Hydraulics and Limits
 - Visualisation of vapour-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 to predict it. 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 dPs, reduced bottoms, others. Which can be trusted? Liquid and vapour sensitivity field tests: identifying the correct flood mechanism.

DAY THREE:

❖ 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 misdistribution, 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.

❖ De-bottlenecking

- State-of-the-art trays and packings: strengths and weaknesses. Factors that favour trays and factors that favour 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 (eg Superfrac, VG Plus, MD): principles, tricks, and traps. Do they really give 30% more capacity than conventionals?

DAY FOUR:

❖ Distillation Control

- Assembling control loops into an overall scheme: what works, which is better, what causes instability, and what impairs efficiency. The three 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 it? How can a temperature controller be fooled? Reboiler, condenser, and pressure controls: which loops work and which misbehave. How dead pockets in vapour overhead lines interfere with controls. Understanding hot vapour bypasses: why some work while others don't. Control systems that did not work.

DAY FIVE:

❖ Avoiding Tower Malfunctions

- The 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 vapour? 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
- ❖ Course Conclusion
- ❖ Post-Test and Evaluation

Training Requirement:

“Hand’s on practical sessions, equipment and software will be applied during the course if required and as per the client’s request”.

Please note that the above topics can be amended as per client’s learning needs and objectives. Further, it should be forwarded to us a month prior to the course dates.

Training Methodology:

This interactive training course includes the following training methodologies as a percentage of the total tuition hours:-

- 30% Lectures, Concepts, Role Play
- 70% Workshops & Work Presentations, Techniques, Based on Case Studies & Practical Exercises, Software & General Discussions
- Pre and Post Test

Training Certificate(s):

Internationally recognized certificate(s) will be issued to each participant who completed the course.

Training Fees:

As per the course location - This rate includes participant’s manual, hand-outs, buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

Note: The 5% VAT (Value Added Tax), will be effective starting 01st of January 2018 as per the new regulation from the UAE Government. The VAT applies for all quotation both for local and abroad.

Training Timings:

Daily Timings:

07:45 - 08:00	Morning Coffee / Tea
08:00 - 10:00	First Session
10:00 - 10:20	Recess (Coffee/Tea/Snacks)
10:20 - 12:20	Second Session
12:20 - 13:30	Recess (Prayer Break & Lunch)
13:30 - 15:00	Last Session

For training registrations or in-house enquiries, please contact:

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Training & Career Development Department

