

MASS TRANSFER SCHOOL

Coming in 2009

to the Koch-Glitsch
global headquarters,
Wichita, KS, USA



Participate in a
unique 5-day course
taught by chemical
engineering
professionals with
extensive mass
transfer experience
that combines
classroom lectures
and practical
application through
hands-on
experiments in a
world-class pilot plant.

Transforming
Daily Life[™]

Mass Transfer School

Who should attend?

Engineers in the refining, petrochemical, chemical, and EPC industry involved in the design, selection, or operation of distillation and/or absorption towers. This course will be most beneficial to persons who have experience working with mass transfer equipment.

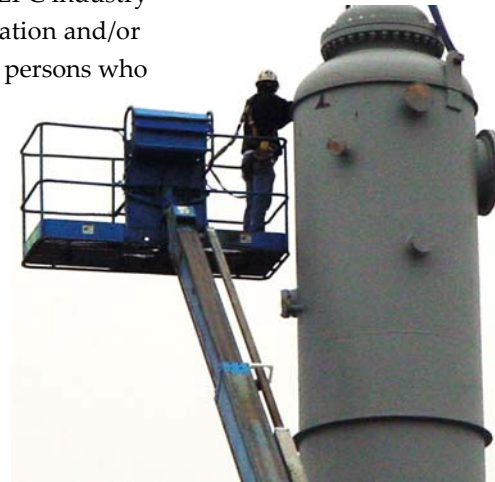
Course objectives

Upon completion of this course, the participants should have a better understanding of:

- ▶ The underlying fundamentals of different types of mass transfer devices
- ▶ The operation of trays, packing, and distributors (including hands-on training in a pilot plant)
- ▶ How to do basic mass transfer equipment calculations
- ▶ The ranges of applicability of different mass transfer devices
- ▶ Equipment design and selection

Course structure

What makes this course different is the hands-on component. Approximately 50% of the course consists of classroom training sessions and about 15% is devoted to attendees working on examples. The other 35% is devoted to hands-on sessions in the pilot plants where the attendees have the unique opportunity to see mass transfer equipment in action. Tray, packing, and distributor demonstrations are conducted in large diameter simulators and distillation towers equipped with sight ports. This gives the attendees the ability to see the hydrodynamic behavior of mass transfer equipment over a wide operating range.



“The larger the pilot plant the lower the scale-up risk”

To reduce technical risks for our customers and for ourselves, Koch-Glitsch and Koch Heat Transfer are constructing commercial scale demonstration units in Wichita, KS, USA. The units are industrial scale but are instrumented like laboratory units.

The tower (shown above) will be used to demonstrate the performance of a wide range of equipment:

- ❑ One-pass and 2-pass trays
- ❑ High capacity tray devices
- ❑ Random packing
- ❑ Structured packing
- ❑ Grid
- ❑ Liquid and vapor distribution devices
- ❑ Mist elimination devices

Course Content

Session 1 (Monday - 1 day)

Distillation fundamentals

- ❑ General concepts
- ❑ Phase equilibria
- ❑ Thermodynamics and phase equilibrium calculations (including 2 tutorials)
- ❑ Flash distillation (including 1 tutorial)
- ❑ Equilibrium stage concept
- ❑ Binary distillation calculations (including 1 tutorial)
- ❑ Distillation calculations using process simulation software (including 1 tutorial)
- ❑ Extracting hydraulic information from simulations (including 1 tutorial)

Session 2 (Tuesday - 1 day)

Packed towers

- ❑ Underlying fundamentals that drive packing performance
- ❑ Interfacial mass transfer fundamentals
- ❑ The concepts of HTU, NTU, and HETP
- ❑ Packing efficiency
- ❑ Entrainment and Flooding in packed towers (including 2 pilot plant demonstrations)
- ❑ Models for predicting packed tower capacity
- ❑ Pressure drop in packed towers – predictive methods
- ❑ Liquid hold-up in packed towers
- ❑ Packing types and selection criteria (including 1 tutorial)
- ❑ Design of a packed towers (including 2 tutorials)



More information coming soon to our Web site:
www.koch-glitsch.com

Session 3 (Wednesday - 1 day)

Distributors, internals and mechanical design

- ❑ Fluid flow fundamentals and basic flow calculations
- ❑ The design of feed pipes for packed towers
- ❑ Trough distributors (including 1 pilot plant demonstration)
- ❑ Pan & Deck distributors
- ❑ Liquid collectors
- ❑ Support grids and hold-down grids
- ❑ Vapor inlets for packed towers
- ❑ The design of feed pipes for tray towers
- ❑ Vapor inlets for tray towers
- ❑ Mechanical design – supports, clips, beams

Session 4 (Thursday/Friday - 1 ½ days)

Towers equipped with trays

- ❑ Cross-flow tray fundamentals
- ❑ Bubbling devices
- ❑ Downcomer options
- ❑ The effect of liquid rate on tray performance (including 1 pilot plant demonstration)
- ❑ Capacity limits (including 1 pilot plant demonstration)
 - entrainment flooding
 - downcomer choke flooding
 - downcomer backup flooding
- ❑ Performance of different bubbling devices (including 1 pilot plant demonstration)
- ❑ Pressure drop
- ❑ Weeping
- ❑ Tray efficiency
- ❑ Fouling
- ❑ Tray design and equipment selection (including 1 tutorial)
- ❑ Ultra high-capacity tray devices

Session 5 (Friday - ½ day)

Rate-based simulation

- ❑ Fundamentals of rate-based simulation
- ❑ RATEFRAC® rate-based simulation training (including 1 tutorial)
- ❑ **Comprehensive exercise using knowledge gained from all sessions**

ABOUT US

Dr. Izak Nieuwoudt

Izak has more than 20 years experience in the field of separation technology. He has authored more than 70 journal papers, conference papers and book chapters. He is listed as an inventor on 15 patents in this field. His fields of expertise are in mass transfer fundamentals, packing and tray development, and modeling. He is the R&D director at Koch-Glitsch and serves as Koch-Glitsch's representative on the technical advisory committee of FRI.

Dr. Michael Lockett

Mike has more than 40 years of experience in the field of mass transfer. He is the author of the much cited book "Distillation Tray Fundamentals". He has authored 70 journal and conference papers and is listed as an inventor on 42 patents. He is a globally recognized authority in the fields of trays and structured packing. He is a principal research consultant at Koch-Glitsch R&D and serves as Koch-Glitsch's representative on the executive committee of FRI.

Patrick Quotson

Pat has more than 20 years experience in the field of mass transfer. His field of expertise is packing applications and he is the packing product manager at Koch-Glitsch.

Darren Headley

Darran has more than 20 years experience in the field of mass transfer. His fields of expertise are liquid distributors, tower internals and mechanical design. He is leading the mechanical design group at Koch-Glitsch.

Jeff DeGarmo

Jeff has more than 25 years experience in the field of mass transfer and is an authority in the fields of catalytic distillation and rate-based simulation. He has authored 18 papers and conference publications in the field of mass transfer. He is the pilot plant manager at Koch-Glitsch.

Koch-Glitsch, LP and its affiliates are global leaders in the supply of mass transfer and mist elimination equipment, as well as other process technologies and related services. The company's products are found in refineries and chemical plants worldwide.



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