Improving Mixing Processes for Industrial Applications

25th & 26th June 2013
BHR Group, Cranfield, UK

The Improving Mixing Processes Course is designed for experienced engineers and graduates, scientists and fluid engineering managers from:

✓ the chemical, process or related industries (biochemical, pharmaceutical, personal care)
✓ who are involved in product or process development, design, operation or research and
✓ who are seeking to improve their subject knowledge

Attend and learn how to...

✓ apply mixing concepts in many industrial processes
✓ design and scale-up systems
✓ identify and solve mixing related problems

“Join me and Senior BHR Group Consultants in June where we will explain the critical function of Industrial Mixing Processes, how to design and improve systems and, at a more advanced level, solve any mixing related problems.”

Mike Papworth, Course Manager

Book now at www.bhrgroupconferences.com
Overview

The course will communicate principles of fluid mixing, provide recommendations for process design and scale-up, plus enable participants to apply these principles and recommendations to their mixing processes/problems. Additionally the Course will discuss specifications for the optimal selection and operation of mixing equipment.

Improved Mixing Processes

Mixing is fundamental to process efficiency and product quality.

• Flexibility in operation (multiple products from one plant; variable batch sizes)
• Product consistency and repeatability
• Success in scale-up/scale-down

These are some of the mixing related concerns of industrialists which require a good understanding of the underlying mechanisms and principles. BHR Group developed this specialist course, using feedback from the previous sixteen courses to ensure that it will meet and exceed the evolving requirements of global industrial organisations.

“This was a well presented course which provided a thorough understanding of mixing fundamentals and practice in a short timeframe. The set of notes that accompany the course will provide a comprehensive reference in the future.”

Darren Gobby and Neil Turner, Lucite International UK Ltd

“We found the process mixing course provided an excellent overview of the fundamentals surrounding industrial scale mixing. The insights gained during the course have resulted in an improved understanding of the controlling factors in our mixing applications. This fundamental approach has provided opportunities to improve the efficiency of our mixing equipment resulting in improved product quality.”

Ian Taylor and James Bruce from Dow Corning, Barry, UK

“This course exceeded my expectations.”

Dr Chris Guske, Tate and Lyle, USA

An industrial workshop session will be held on day two. This will provide delegates with the opportunity to discuss various mixing related problems and attendees are encouraged to bring examples to the workshop. If required, appointments can be arranged to discuss these privately with engineers from BHR Group.
**Course Programme**

**DAY ONE**  
Tuesday 25th June 2013

*Emphasises the importance of mixing in the process industries, and introduces mixing equipment and concepts relevant to mixing applications. Liquid blending, immiscible liquid dispersion, and reactive mixing processes are covered in detail.*

**Why Mixing Matters – Introduction**  
Objectives and layout of course. Importance of mixing in industrial processes, consequences of failures in mixing processes, energy savings and social benefits, examples of capital and operating cost savings.

**Mixer Types and Associated Equipment**  
Different types of mixers (top, submerged and bottom entry mixers, static mixers, jet mixed systems and associated equipment), flow patterns, general guide to impeller selection, mechanical design

**Mixing Concepts**  
Process requirements, dimensionless groups, flow regimes (laminar, turbulent, transitional), power requirements for mixing processes, rules for scale-up and scale-down.

**Liquid Blending**  
Mechanisms of blending; blending regimes; blending liquids of low-to-medium viscosity (turbulent and transitional regimes); scale-up and down; blending high viscosity liquids (laminar regime); blending liquids of different properties (including video demonstrations); CSTRs; blending with jets.

**Reactive Mixing**  
Effect of mixing on multiple reactions, micro and meso mixing models, effect of process parameters on reaction productivity, optimisation and scaling of reactive systems to increase productivity and reduce waste in the reactor.

**Liquid-liquid Dispersions**  
Phase continuity, deformation and break-up of drops (including video demonstrations), coalescence phenomenon, impeller section, mass transfer in liquid-liquid dispersions.

*Tutorial – Example calculations, case studies  
Tour of laboratories and mixing pilot plants at BHR Group*

**DAY TWO**  
Wednesday 26th June 2013

*Covers more single and multiphase mixing applications: solid-liquid dispersions and gas-liquid mixing, in-line & high intensity mixers, heat transfer and computational fluid dynamics (CFD)*

**Solid-liquid Mixing**  
Solid suspension: mechanistic and empirical models for solid suspension, power requirements, scale-up and down, jet solid suspension; solids distribution: multiple impellers; solid draw-down.

**In-line and High Intensity Mixing**  
Blending, gas-liquid mixing and liquid-liquid mixing using in-line equipment (static mixers, ejectors and rotor stator mixers).

**Heat Transfer**  
Introduction to concepts related to heat transfer in mixing equipment.

*Industrial Workshop/Questions and discussion of case studies from Course Attendees.*

**Gas-liquid Mixing**  
Gas-liquid mixing design guidelines for low-to-medium viscosity liquids; power requirements and effect of scale on gas dispersion; hold-up and mass transfer; scale-up and down; multiple impellers.

**Computational Fluid Dynamics (CFD)**  
How and why CFD is used to solve single and multiphase mixing and reaction problems.

*Close of Course*
Course fees

A discount is offered for the third and subsequent course delegates from the same organisation.

Discounts are offered for FMP Members:

- **Fee for Delegate 1-2:** £895 + VAT
- **FMP members 1-2:** £795 + VAT
- **3rd Delegate (50% off):** £447.50 + VAT
- **3rd FMP Member (50% off):** £397.50 + VAT

Includes tuition, CD of lecture notes, Tuesday course dinner, lunches and refreshments daily.

**PRICES ARE EXCLUSIVE OF VAT CHARGED AT 20%**

Payment options

An invoice will be issued on receipt of registration. Payment options:

- Use your credit card and Book on-line now.
- Cheques should be made payable to Virtual PiE Ltd.
- Bank transfers should be paid to our account at:

  Barclays Bank  
  Coventry Fletcham Highway Branch
  513 Fletchamstead Highway
  Coventry, UK, CV4 9EJ  
  **Account number:** 33034771  
  **Bank sort code:** 20-23-55  
  **IBAN Number:** GB30 BARC 2023 5533 0347 71  
  **SWIFT BIC:** BARCGB22

Credit card payment details should be entered on the online reservation form by completing the appropriate boxes. Please quote **MX613** and **name of delegate and company** on all transactions.

Cancellation

A full refund (minus a £100 administration fee) will be made for cancellations received on or before 21 days prior to the start of the event. No refund will be made for cancellations 21 days or less prior to the event start. In the event of BHR Group cancelling the event, a full refund will be paid. Substitutions may be made at any time.

Venue and Accommodation

Delegates are responsible for booking their own accommodation through the Course Administrator.

Please contact Mrs Joyce Raymond at confx3@bhrgroup.co.uk or directly on: +44 (0) 778 562 1692.

Enquiries

If you are interested in attending the course or if you require more details, please contact:

**Joyce Raymond**  
**Course Organiser, BHR Group**  
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