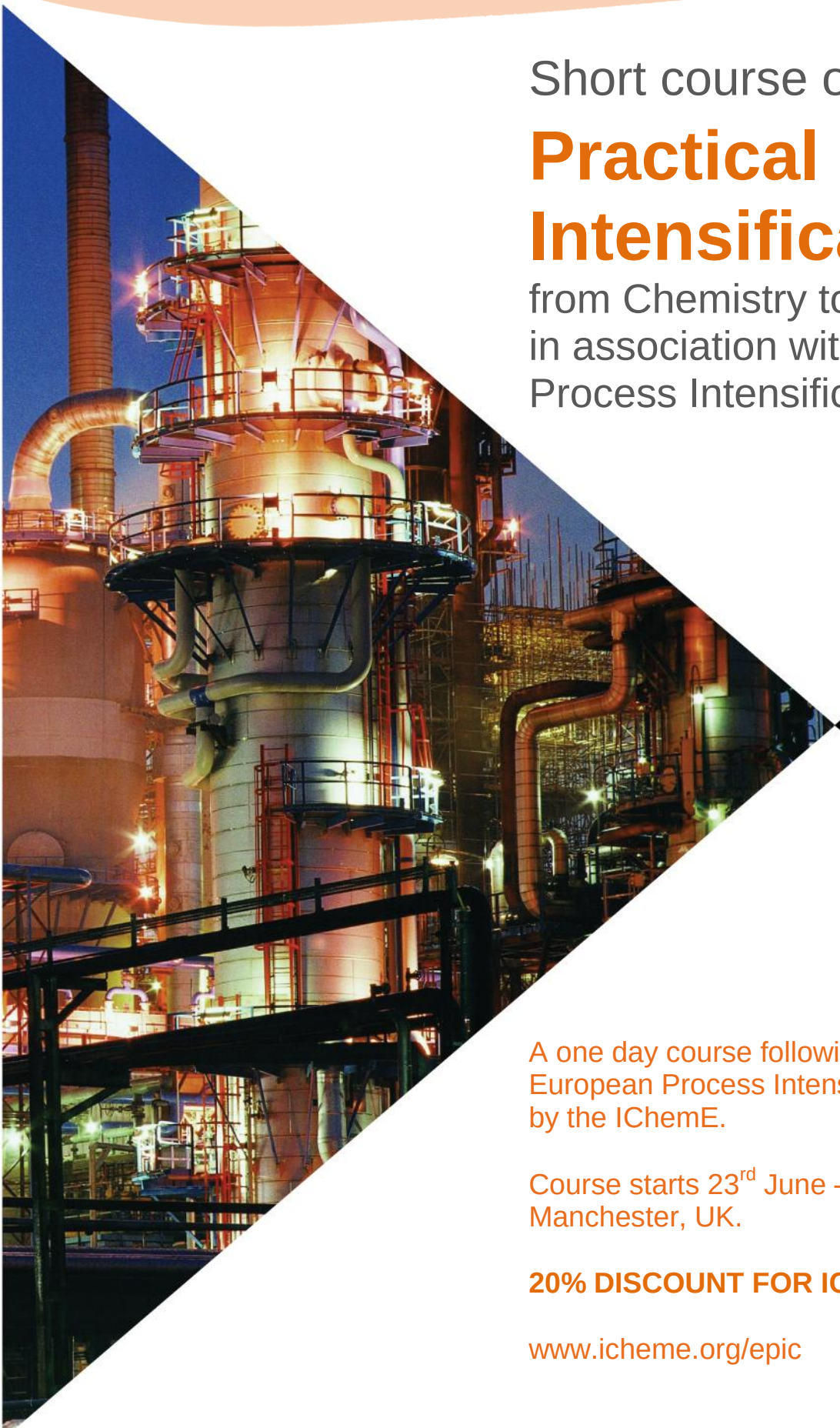
IChemE
Institution of Chemical Engineers

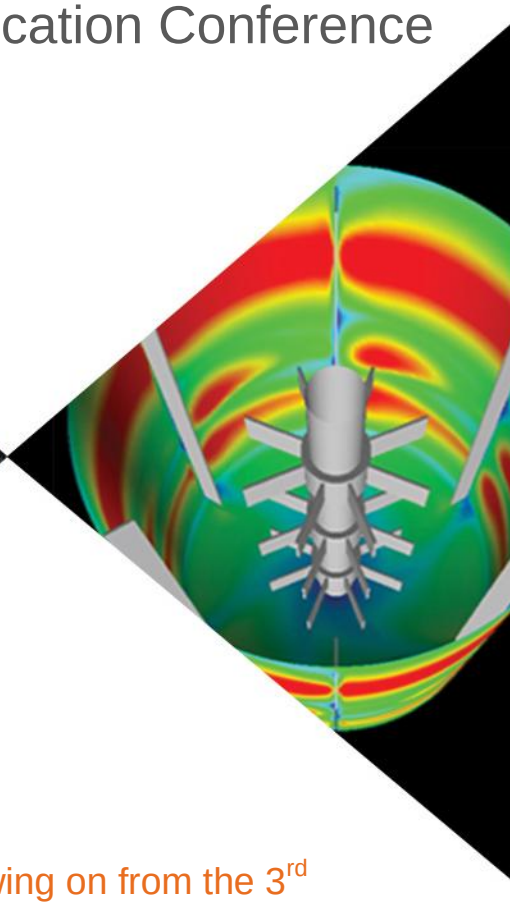
BHR Group
EXPERTS IN FLUID ENGINEERING

Short course on

# Practical Process Intensification

from Chemistry to Engineering
in association with the 3rd European Process Intensification Conference





A one day course following on from the 3rd European Process Intensification Conference run by the IChemE.

Course starts 23rd June – 24th June 2011
Manchester, UK.

**20% DISCOUNT FOR IChemE MEMBERS**

www.icheme.org/epic

## Why should I attend?

- Understand how and when to apply process intensification in industrial processes.
- Learn more about lab testing and equipment involved.
- Learn about implementation methodologies for process intensification.
- How to maximise knowledge of a process, prior to scale up.
- Be able to identify and solve process challenges using intensified technologies.

## Introduction to Process Intensification

Process Intensification (PI) is increasingly being used as an effective way to expand productive capacity and update ageing batch processes without the need for large civil engineering investment. The technology is well-established and as it often achieves yield improvements and waste reductions, the present economic climate is driving the number of applications at a rapid rate of growth. Process Intensification offers:

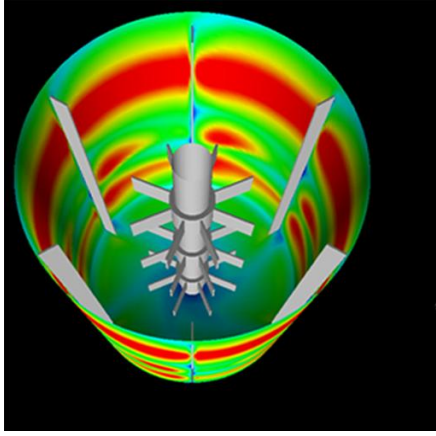
- Higher yields and better product consistency and repeatability
- Energy savings and reduced operating costs
- Plan capital cost reductions

However achieving success with an intensified process is more than just selecting the right reactor. It may require the redesign of other operations, improvements to the chemistry through changes to operating conditions and/or catalysis. PI can help control, instrumentation and on-line analytics. These are some of the factors important to industrialists seeking a move towards PI, all of which require a good understanding of the underlying mechanisms and principles. The understanding of these key mechanisms and principles can also be applied to process scale up more generally, helping to achieve more successful development to full scale.

BHR Group has been active in the field of Process Intensification and process optimisation for over 20 years and provides a range of services and products to help industry implement PI solutions. This course has been developed from specialist in-house courses given to industrial clients in Europe and the USA and incorporates practical teaching on a range of PI technologies, case histories worked examples and participative exercises.

Book now

# Process Intensification: a step change in product, process and business performance through in-depth understanding of fluid dynamics and process chemistry.



## Ideal for:

- From the chemical and related industries (biochemical, pharmaceutical, personal care.
- Who are involved in process development, design operation or research.
- Who will benefit from understanding the principles and learning more about the subject.

## Course description

The course aims to communicate the principles of Process Intensification, whilst providing recommendations for process design and implementation, enabling participants to apply these principles and recommendations to their PI processes/problems, and discuss specifications for the selection and operation of PI equipment from an independent standpoint.

Thursday afternoon outlines the basic principles, emphasises the importance of chemistry, heat and mass transfer to these processes and puts forward the business perspective for PI implementation. A case history illustrates how PI has been applied and what was gained from the process.

Friday morning introduces the PI methodology and the 'tool kits' of laboratory and process plant knowledge specific for PI implementation. Delegates will see how problems can be solved with a range of different equipment types from the traditional to those which push the boundaries of mixing and heat transfer capabilities. Once again the day's work is interspersed with case histories, worked examples and practical exercises.

**Course Director**

**Jeanette Simpson, MA, M Eng, AMIChemE, BHR Group Limited,** is Business Manager for BHR Group Process Consultancy, working alongside leading international petrochemical, pharmaceutical and fine chemical companies. Prior to joining the group as a Senior Engineer, she was a Senior R&D Engineer in a Global FMCG company, and has run projects in UK, Europe, India, China & the USA.

**Course lecturers include**:

**Richard Jackson, PhD, BSc, MRSC.CCHEM,** is BHR Group's Chief Chemist, PI champion and a founder director of BHR Biofuels, (a company implementing PI technologies on green fuel projects). Before joining BHR, Richard worked for 10 years on a wide range of laboratory, plant and scale up development projects in the UK and in the USA, including complete plant implementations. His expertise spans international bulk, pharmaceutical and performance chemical companies.

# Course programme

## **Day one (pm):** Introduction and Basic Technology Day

**Thursday 23rd June 2011 – the course will start after lunch at the close of EPIC 2011.**

### Introduction to Process Intensification

What is Process Intensification (PI) and what are the key drivers for it? What are the potential benefits of PI compared with the drawbacks? The session introduces the importance of good chemistry and mixing knowledge and how this can help realise the benefits of Process Intensification.

### Chemistry fundamentals

A recap of chemistry basics and the importance of understanding these in a reaction engineering environment. The fundamentals of chemical kinetics, reaction schemes and orders will be linked to the principles of PI and the key indicators for intensifiable reactions will be introduced.

### Mixing and heat transfer fundamentals

The heat and mass transfer principles used in chemical engineering will be built upon to explore a range of environments with differing intensities. Examples of equipment types that can create these environments will be introduced along with useful outline design equations.

### Business drivers?

A key part of PI is the linkage of process objectives with those of the business. This short session will highlight the key business drivers and warnings for the application of PI, and highlight how the two need to work together in order for either to benefit.

### Case history

Illustration of some of the subjects raised during day 1 of the course through an example from BHR Group's consultancy work.

## **Day two (am):** Practical Applications Day

**Friday, 24th June 2011 – the course will close with lunch so you will be on your way by 2pm.**

### Process Intensification Methodologies

A robust methodology for applying PI to a chemical process. See how the fundamentals of kinetics, heat and mass transfer are called upon at each of the stages to build the intensified process and maximise the potential of 'right first time' scale up. Also how the methodology can be useful for non intensified processes to minimise scale up times.

### Worked Example

Apply the learning from day 1 in working through a PI problem – with guidance from the course lecturers.

### Process Intensification Tool Kit: part 1

How to get the most out of the process from the initial chemical bench-top development. The types of equipment to use and the types of tests to explore to maximise the useful information gained from the process.

### Process Intensification Tool Kit: part 2

Explore the range of equipment available at larger scales for PI and their characteristics for heat and mass transfer. A range of different reactor types will be explained and a simplified selection method for them demonstrated.

### Case History

How a chemical process has been intensified and demonstration of how the 'Process Intensification Tool Kits' are used to do this in a plan environment.

### Process Intensification Exercise

Apply all the information learnt to determine whether a process will lend itself to a PI solution.

### Close with lunch Friday 24th June.


# Venue and accommodation

## The Manchester Conference Centre. 15 minutes from Manchester Piccadilly Station. 15 minute shuttle from Manchester airport. Multi-storey car park.

Delegates can book rooms directly at the Manchester Conference Centre fully inclusive double room for £89.
Email clare@days-mcc.co.uk tel: 0161 955 8062.

Or at the IBIS hotel from £59 per night H3143@accor.com tel: 0161 272 5000.

# Cost

The total cost for one day tuition, course notes, lunch, refreshments is £495.00 plus VAT (20%). Please quote **EPIC 2011** and name of delegate and company on all electronic transactions.

## IChemE Members receive 20% discount.

# Cancellations

**No refund will be made on bookings but substitutions can be made at any time.**

# Online Reservations

Please **book online** using the Book now button Book now

An invoice will be issued on receipt of payment.

Please submit one form for each delegate. Photocopies of a blank form may be used.

Bank transfers should be paid to our account at:

National Westminster Bank plc
Cranfield University Branch, Wharley End,
Cranfield, Bedford, MK43 0SR, UK
Account number:36565466
Bank sort code: 60-06-56
IBAN: GB40 NWBK 6006 5635 5654 66
SWIFT BIC: NWBK GB 2L

Credit card payment details should be entered on the Reservations Form by completing the appropriate boxes and signing the form.

# How to book - limited places available

## Online

Book now

## Email

email the registration form to Joyce Raymond at **confx3@bhrgroup.co.uk**

## Telephone

Please call Joyce on **+44 (0)1234 756512**

# Payment

## Invoice terms are **30 days.** We would appreciate payment or proof of payment prior to the course.

## Credit card

Pay online, it´s easier! Book now

## Bank transfers

Payable to: National Westminster Bank Plc,
Cranfield University Branch,
Wharley End, Cranfield,
Bedford MK43 0SR, UK

# About BHR Group

Founded over 60 years ago, BHR Group is an independent contract research, development and consultancy company. Dealing in all aspects of engineering with fluids, BHR Group is recognised, in particular, as the world leading authority on mixing processes. The Group runs a number of client in-house courses on fluid engineering topics. Contact **Sharon Harrison** on **+44 (0) 1234 756571 for details.**

# Enquiries

Enquiries should be addressed to:


### **Joyce Raymond**

## Course Administrator

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# Invoice and registration form

## Practical Process Intensification

### From Chemistry to Engineering

***Manchester, UK: 23rd – 24th June 2011***

## Your details

*Please complete in block letters ticking appropriate boxes*

☐ Prof ☐ Dr ☐ Mr ☐ Mrs ☐ Miss ☐ Ms

| | |
|---|---|
| Last name | First name |
| Position | |
| Company | |
| Company VAT Number | |
| Address | |
| Post/Zip Code | Country |
| Telephone | Fax |
| email | |
| Dietary requirements or special requests | |
| Signature | Date |

## Return to:


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