

# Energy Course

A Eurotek training course



## ERS Energy Course

### An introduction:

As the cost of crude and subsequently refinery fuel increases the need to ensure that refinery processes are efficient in terms of heat integration becomes more important. This course reviews the different types of heat exchangers commonly used in refinery systems and demonstrates the design and sizing of shell and tube heat exchangers as single units and in integrated networks via pinch analysis.

### Learning objectives:

Upon completion of this course, participants will have gained a solid understanding of the heat exchange equipment used in the petroleum industry and the techniques used to optimise energy use.

After completing this course you will:

- Know the range of heat exchanger types used in the petroleum industry and understand the key strengths and weaknesses of each type
  - Have a detailed knowledge of the most commonly used heat exchanger types
  - Be able to troubleshoot typical heat exchanger applications, based on a knowledge of the symptoms and root causes of commonly occurring problems
  - Understand the key issues affecting the reliability of heat exchange equipment
- Be aware of the economic impact of fouling and the methods available to monitor and control fouling
  - Be able to identify heat transfer and hydraulic bottlenecks and address them with a toolkit of debottlenecking solutions
  - Understand the underlying principles of process integration
  - Apply process integration techniques to develop practical retrofit projects to save energy and reduce fouling



## Who should attend?

Professionals working in the petroleum processing industry will benefit from this course, especially those with a responsibility for energy management and efficiency. The material presented is relevant to all engineers working on processing units in the industry, including operations, design and maintenance personnel.

Job Titles/Functions Appropriate for the Course Include:

- Process, plant and project engineers
- Thermal and stationary equipment engineers
- Personnel responsible for inspection, maintenance and reliability
- Shutdown planners

## Description:

The transfer of thermal energy is a fundamental requirement of all petrochemical and refining processes and heat exchangers are key components in all processing units.

The purpose of this course is to provide process engineers with a wider understanding of the heat exchange equipment used in the petroleum industry

The focus of the course is on maximising the effectiveness of existing plant through improvements in reliability, avoiding common problems, identifying and resolving bottlenecks and improving overall energy efficiency.

The course covers the wide range of heat exchanger types used in the industry and assesses the strengths and weaknesses of each type. A more detailed study of the most commonly used types is made with reference to typical petroleum industry applications. A guide is given to typical problems experienced with operating heat exchangers and ways to avoid or resolve such issues.

Reliability is a key requirement of petroleum industry equipment and heat exchangers are no exception. The root causes of poor reliability are discussed and the design techniques used to address them are described. The thermal, hydraulic and cost impact of fouling is reviewed and techniques to monitor fouling are presented.

Where heat exchangers present constraints to the process, there are a range of options available to create economically viable debottlenecking projects. The full range of options is discussed including the use of compact heat exchangers, extended surfaces, tube inserts and special bundle options (helical baffles, twisted tubes etc.). The selection of the appropriate technique is a question of identifying the relevant constraint and matching it to the most suitable technology.

The final day of the course is dedicated to the practical application of process integration (pinch technology) to petroleum processing plants. This powerful technique has the potential to identify realistic energy targets and define plant modifications to achieve these targets. However, the theoretical tools must be combined with a practical and cost-effective approach to deliver truly effective retrofit projects. The underlying theory is presented along with practical guidelines to developing projects which actually work. The application of pinch techniques to reduce fouling, which often contradicts classic pinch theory, is also covered.



## Course Presenter

Ian Gibbard is the owner of Progressive Thermal Engineering, a consultancy dedicated to the application of industrial heat exchange technology. He established the company in 2002 following a career in heat exchanger engineering. After joining John Brown Engineers and Constructors as a graduate he worked on numerous process industry projects as a heat transfer engineer. In 1993 he joined Cal Gavin Limited, a leading provider of heat transfer enhancement solutions to the process industry, becoming Managing Director in 1998. Progressive Thermal Engineering has completed many challenging projects in both plant design and process troubleshooting, serving a client base in the process and power generation industries.

Ian presents numerous training courses on heat transfer and energy management subjects and has conducted training in more than twenty countries. He is both a trainer and a course developer for Heat Transfer Research Incorporated (HTRI).

Ian has a First Class degree in Chemical Engineering from Loughborough University of Technology.

Ian is the author of numerous articles and papers, a recent selection of which is as follows:

- The Use of CFD to Solve Heat Exchanger Problems, Hydrocarbon Engineering
- Improving Plant Operations with Heat Transfer Enhancement, Petroleum Technology Quarterly
- The Potential for Using HTE in Vent and Reflux Condensers, Eurotherm Seminar
- Debottlenecking Using Heat Transfer Enhancement, Chemical Engineering



## Course programme

### Day 1

Types of heat exchanger

- Shell and tube
- Hairpin
- Air-cooled heat exchanger
- Plate and frame
- Welded plate
- Spiral

Shell and Tube Heat Exchangers

- STHE arrangements
- Typical applications
- Troubleshooting

Air-Cooled Heat Exchangers

- Typical applications
- Troubleshooting

Steam Surface Condensers

- Applications
- Performance monitoring
- Troubleshooting

Waste Heat Boilers

- WHB types
- Applications
- Troubleshooting

### Day 2

Heat exchanger reliability

- Erosion and corrosion
- Vibration
- Fatigue
- Flange leakage
- Tube-to-tubesheet joints

Fouling and Fouling Monitoring

- Fouling mechanisms
- The cost of fouling
- Monitoring fouling
- Cleaning schedules

Revamping and Debottlenecking

- Identifying constraints
- Heat exchanger enhancement
- Advanced bundle designs

### Day 3

Energy Optimisation using Pinch Analysis

- Basics of pinch analysis
- Composite curves
- Energy targetting

Using pinch analysis to improve energy efficiency

- For crude distillation units
- For other plant types

Using pinch techniques to reduce fouling

- Fouling threshold models
- Revamping crude units to reduce fouling



**Registration form:****Energy Course:**

Sir Christopher Wren's House Hotel, Windsor, UK

Please make a reservation at ERS Course for the following delegate:

Title \_\_\_\_\_ Given Name \_\_\_\_\_ Family Name \_\_\_\_\_  
Position \_\_\_\_\_ Company \_\_\_\_\_  
Address \_\_\_\_\_  
Tel: \_\_\_\_\_ Fax : \_\_\_\_\_ Email: \_\_\_\_\_

For Bookings Received before 26<sup>th</sup> August: Course fee £1850.00 + 20% VAT

For Bookings Received after this date: Late Booking Supplement of £250.00 + 20% VAT will be applied

Eurotek Refining Services Ltd has obtained a special Conference rate at the Sir Christopher Wren's House Hotel. Bookings at this hotel must be made via Eurotek Refining Services.

- Single room per night (incl. breakfast) £116.67 + 20% VAT
- Double room per night (incl. breakfast) £133.33 + 20% VAT

Arrival Date \_\_\_\_\_ Departure Date \_\_\_\_\_ Number of nights required \_\_\_\_\_

PLEASE NOTE: Payment to be made at time of reservation. If an invoice is required to make payment by bank transfer or cheque please email your request or Purchase order to [reservations@eurotek-refining.co.uk](mailto:reservations@eurotek-refining.co.uk) and an invoice will be emailed by return.

Make cheque payable to Eurotek Refining Services Ltd.

Transfers to: Account Eurotek Refining Services Ltd IBAN No. GB91LOYD30987301811462

Cancellations, Substitutions & Programme Changes If you are unable to attend the course, you may make a substitution at any time. All substitutions and name changes must be received in writing by mail, e-mail, or Fax. For cancellations received by mail, e-mail or Fax 21 days before course start, 75% of the fees will be refunded. For cancellations received after this date course papers will be sent, but no refund. An official cancellation number must be obtained from Eurotek Refining Services Ltd to qualify for a refund. Course content may be subject to change at Eurotek Refining Services Ltd.'s discretion

**Course timetable:****26<sup>th</sup> September**

08.00 Onwards Course Registration  
09:00-17:00 Course Programme

**27<sup>th</sup> September**

09:00-17:00 Course Programme  
20:00 Course Dinner (free)

**28<sup>th</sup> September**

09:00-16:00 Course Programme

**Five ways to book**

1. Complete and return this form to: Eurotek Refining Services Ltd 389 Woodham Lane, Addlestone Surrey KT15 3PP UK

2. Telephone with details on: +44 1932 702914 or +44 1737 830077

3. Complete and return this form to:  
[Reservations@eurotek-refining.co.uk](mailto:Reservations@eurotek-refining.co.uk)

4. Visit our website at [www.eurotek-refining.co.uk](http://www.eurotek-refining.co.uk) and click on Registration Form.

5. Complete and Fax this form to: +44 1737 830239



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