

# Introduction to Pinch Analysis

## INTRODUCTION

Pinch analysis is a powerful tool for improving the design of industrial processes, based on a simple and elegant application of basic thermodynamics. Its main use is in improving energy efficiency through heat integration for continuous plant operations, but it also has applications in distillation system design, debottlenecking, mass transfer, waste minimization and other areas.

*Introduction to Pinch Analysis* is a 2-day workshop designed to present the main principles of pinch analysis and to inform delegates about the scope, potential and limitations of this important methodology.

## WHO SHOULD ATTEND

The workshop is aimed at energy managers and engineers involved in plant operation, troubleshooting and process design in the process industries, including oil refining, chemicals & petrochemicals, pulp & paper and food & beverages.

## WORKSHOP OBJECTIVES

**Participants attending the program will learn how to:**

- Construct composite curves and grand composite curves
- Calculate energy targets and multiple utility targets.
- Design and simplify heat exchanger networks using pinch principles.
- Apply pinch analysis to retrofit situations
- Identify situations where pinch analysis is an appropriate tool to use.
- Organize a successful pinch project.

## TRAINING METHODOLOGY

In addition to lectures and discussions, the delegates will learn by active participation through the use of problem-solving exercises, hands-on use of computer tools, software demonstrations, group discussions, and analysis of real-life case studies. Delegates will receive a copy of “mini-PinchExcel”, a simple pinch targeting spreadsheet.

## COURSE OVERVIEW

- Background
- Energy Targeting and Composite Curves
  - The Heat Exchanger Network Design Problem
  - Constructing Composite Curves
  - $DT_{min}$ ,  $Q_{h,min}$ ,  $Q_{c,min}$
  - Capital/Energy Trade-offs
- Heat Exchanger Network Design
  - The Pinch Principle
  - The Grid Diagram
  - CP rules
  - Loops and Paths

- Multiple Utility Targeting and the Grand Composite Curve
  - The Problem Table and Multiple Utility Targets
  - The Grand Composite Curve
  - Segmented Utilities
  - HEN Design for Multiple Utility Problems
- Retrofit Design
- Industry Examples

## **ABOUT THE COURSE LEADER**

The Course Director, **Dr. Alan Rossiter**, is President of Rossiter & Associates, an industrial energy efficiency consulting company based in Bellaire, Texas. Clients include ExxonMobil, ConocoPhillips/Phillips 66, Citgo, Syncrude Canada, Sasol (Pty) Ltd. (South Africa), LyondellBasell, Albemarle, and the Government of Canada.

Dr. Rossiter worked for nearly ten years with ICI (Imperial Chemical Industries) in England, serving in a variety of technical and managerial positions in process design, operations and troubleshooting. He also worked for eight years with Linnhoff March, Inc., a consulting firm specializing in pinch analysis.

A native of Zimbabwe, Dr. Rossiter holds a Ph.D. in chemical engineering from the University of Cambridge, England, and has more than 25 years of engineering and management experience. A frequent conference speaker and course instructor, he has more than 70 publications in energy efficiency and waste minimization, including the McGraw-Hill book, "Waste Minimization through Process Design" (1995), the "Energy Management" article in the *Kirk-Othmer Encyclopedia of Chemical Technology, 5th Edition*, (John Wiley & Sons, 2005), and his newest book, *Energy Management and Efficiency for the Process Industries* (AIChE/Wiley, 2015). He is a chartered engineer, a registered professional engineer (Texas), and a fellow of the AIChE.