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Autore	Kemp Ian C
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study; Exercise; Chapter 3: Data extraction and energy targeting; 3.1 Data extraction; 3.1.1 Heat and mass balance; 3.1.2 Stream data extraction; 3.1.3 Calculating heat loads and heat capacities; 3.1.4 Choosing streams; 3.1.5 Mixing; 3.1.6 Heat losses; 3.1.7 Summary guidelines; 3.2 Case study: organics distillation plant; 3.2.1 Process description; 3.2.2 Heat and mass balance; 3.2.3 Stream data extraction; 3.2.4 Cost data; 3.3 Energy targeting; 3.3.1 T[sub(min)] contributions for individual streams; 3.3.2 Threshold problems
3.4 Multiple utilities 3.4.1 Types of utility; 3.4.2 The Appropriate Placement principle; 3.4.3 Constant-temperature utilities; 3.4.4 Utility pinches; 3.4.5 Variable-temperature utilities; 3.4.6 Balanced composite and grand composite curves; 3.4.7 Choice of multiple utility levels; 3.5 More advanced energy targeting; 3.5.1 Zonal targeting; 3.5.2 Pressure drop targeting; 3.6 Targeting heat exchange units, area and shells; 3.6.1 Targeting for number of units; 3.6.2 Targeting for the minimum number of units; 3.6.3 Area targeting; 3.6.4 Deviations from pure countercurrent flow
3.6.5 Number of shells targeting 3.6.6 Performance of existing systems; 3.6.7 Topology traps; 3.7 Supertargeting: cost targeting for optimal T[sub(min)]; 3.7.1 Trade-offs in choosing T[sub(min)]; 3.7.2 Illustration for two-stream example; 3.7.3 Factors affecting the optimal T[sub(min)]; 3.7.4 Approximate estimation of ideal T[sub(min)]; 3.8 Targeting for organics distillation plant case study; 3.8.1 Energy targeting; 3.8.2 Area targeting; 3.8.3 Cost targeting; 3.8.4 Zonal targeting; 3.8.5 Targeting with utility streams included
3.9 Appendix: Algorithms for Problem Table and composite curves

Sommario/riassunto

Pinch analysis and related techniques are the key to design of inherently energy-efficient plants. This book shows engineers how to understand and optimize energy use in their processes, whether large or small. Energy savings go straight to the bottom line as increased profit, as well as reducing emissions.This is the key guide to process integration for both experienced and newly qualified engineers, as well as academics and students. It begins with an introduction to the main concepts of pinch analysis, the calculation of energy targets for a given process, the pinch temperature and