1. Record Nr. UNINA9910140189903321 Autore Zhu Frank Xin X Titolo Energy and optimization for the process industries // Frank Xin X. Zhu Pubbl/distr/stampa Hoboken, New Jersey:,: John Wiley and Sons, Incorporation,, 2014 ©2014 **ISBN** 1-118-78250-X 1-118-78254-2 1-118-78253-4 Descrizione fisica 1 online resource (xvii, 513 p.) : ill Classificazione TEC009010 Disciplina 658.5 Soggetti Production engineering Manufacturing processes - Cost control Manufacturing processes - Environmental aspects **Energy conservation** Lingua di pubblicazione Inglese **Formato** Materiale a stampa Livello bibliografico Monografia Nota di bibliografia Includes bibliographical references at the end of each chapters and index. Nota di contenuto Machine generated contents note: Dedications Preface Part 1: Basic concepts and theory Chapter 1: Overview of this book 1.1 Introduction 1.2 Who is the book written for 1.3 Five ways to improve energy efficiency 1.4 Four key elements for continuous improvements 1.5 Promoting improvement ideas in the organization Chapter 2: Theory of Energy Intensity 2.1 Introduction 2.2 Definition of energy intensity for a process 2.3 The concept of fuel equivalent for steam and power 2.4 Energy intensity for a total site 2.5 Concluding remarks 2.6 Nomenclature 2.7 References Chapter 3: Energy benchmarking 3.1 Introduction 3.2 Data extraction from historian 3.3 Convert all energy usage to fuel equivalent 3.4 Energy balance 3.5 Fuel equivalent for steam and power 3.6 Energy performance index method for energy benchmarking 3.7 Concluding remarks 3.8 Nomenclature 3.9 References Chapter 4: Key indicators and targets 4.1 Introduction 4.2 Key indicators represent operation opportunities 4.3 Define key indicators 4.4 Set up targets for key indicators 4.5 Economic evaluation

for key indicators 4.6 Application 1: Implementing key indicators into

an "Energy Dashboard" 4.7 Application 2: Implementing key indicators to controllers 4.8 It is worth the effort 4.9 Nomenclature 4.10 References Part 2: Energy system assessment methods Chapter 5: Fired heater assessment 5.1 Introduction 5.2 Fired heater design for high reliability 5.3 Fired heater operation for high reliability 5.4 Efficient fired heater operation 5.5 Fired heater revamp 5.6 Nomenclature 5.7 References Chapter 6: Heat exchanger performance assessment 6.1 Introduction 6.2 Basic concepts and calculations 6.3 Understand Performance criterion - U values 6.4 Understand pressure drop 6.5 Heat exchanger rating assessment 6.6 Improving heat exchanger performance 6.7 Appendix: TEMA Types of Heat Exchangers 6.8 Nomenclature 6.9 References Chapter 7: Heat exchanger fouling assessment 7.1 Introduction 7.2 Fouling mechanisms 7.3 Fouling mitigation 7.4 Fouling mitigation for crude preheat in oil refining 7.5 Fouling resistance calculations 7.6 A cost-based model for clean cycle optimization 7.7 Revised cost-based model for clean cycle optimization 7.8 A practical method for clean cycle optimization 7.9 Putting all together - A practical example of fouling mitigation 7.10 Nomenclature 7.11 References Chapter 8: Energy loss assessment 8.1 Introduction 8.2 Energy loss audit 8.3 Energy loss audit results 8.4 Energy loss evaluation 8.5 Brainstorming 8.6 Energy audit report 8.7 Nomenclature 8.8 References Chapter 9: Process heat recovery opportunity assessment 9.1 Introduction 9.2 Data extraction 9.3 Composite curves 9.4 Basic concepts 9.5 Energy targeting 9.6 Pinch golden rules 9.7 Cost targeting: determine optimal Δ Tmin 9.8 Case study 9.9 Be aware of sub-optimal 9.10 Integrated cost targeting and process design 9.11 Challenges for applying the systematic design approach 9.12 Nomenclature 9.13 References Chapter 10: Heat recovery modification assessment 10.1 Introduction 10.2 Network pinch - the bottleneck of existing heat recovery system 10.3 Identification of modifications 10.4 Automated network pinch retrofit approach 10.5 Case studies for applying the network pinch approach 10.6 References Chapter 11: Process integration opportunity assessment 11.1 Introduction 11.2 Definition of process integration 11.3 Plus and minus (+/-) principle 11.4 Grand composite curves 11.5 Appropriate placement principle for process changes 11.6 Examples of process changes 11.7 References Part 3: Process system assessment and optimization Chapter 12: Distillation operating window 12.1 Introduction 12.2 What is distillation 12.3 Distillation efficiency 12.4 Definition of feasible operating window 12.5 Understanding operating window 12.6 Typical capacity limits 12.7 Effects of design parameters 12.8 Design check list 12.9 Example calculations for developing operating window 12.10 Concluding remarks 12.11 Nomenclature 12.12 References Chapter 13: Distillation system assessment 13.1 Introduction 13.2 Define a base case 13.3 Calcu7lations for missing and incomplete data 13.4 Building process simulation 13.5 Heat and material balance assessment 13.6 Tower efficiency assessment 13.7 Operating profile assessment 13.8 Tower rating assessment 13.9 Heat integration assessment for column design 13.10 Guidelines for reuse of an existing tower 13.11 Nomenclature 13.12 References Chapter 14: Distillation system optimization 14.1 Introduction 14.2 Tower optimization basics 14.3 Energy optimization for distillation system 14.4 Overall process optimization 14.5 Concluding remarks 14.6 References Part 4: Utility system assessment and optimization Chapter 15: Modeling of steam and power system 15.1 Introduction 15.2 Boiler 15.3 Deaerator 15.4 Steam turbine 15.5 Gas turbine 15.6 Letdown valve 15.7 Steam desuperheater 15.8 Steam flush drum 15.9 Steam trap 15.10 Steam distribution losses 15.11 Nomenclature 15.12 References Chapter 16: Establishing steam

balances 16.1 Introduction 16.2 Guidelines for generating steam balance 16.3 A working example for generating steam balance 16.4 A practical example for generating steam balance 16.5 Verify steam balance 16.6 Concluding remarks 16.7 Nomenclature 16.8 References Chapter 17: Determining steam pricing 17.1 Introduction 17.2 The cost of steam generation from boiler 17.3 Enthalpy-based steam pricing 17.4 Work-based steam pricing 17.5 Fuel equivalent-based steam pricing 17.6 Cost-based steam pricing 17.7 Comparison of different steam pricing methods 17.8 Marginal steam pricing 17.9 Effects of condensate recovery on steam cost 17.10 Concluding remarks 17.11 Nomenclature 17.12 References Chapter 18: Benchmarking steam and power system 18.1 Introduction 18.2 Benchmark steam cost - minimize generation cost 18.3 Benchmark steam and condensate losses 18.4 Benchmark process steam usage and energy cost allocation 18.5 Benchmark steam system operation 18.6 Benchmark steam system efficiency 18.7 Nomenclature 18.8 References Chapter 19: Steam and power management and optimization 19.1 Introduction 19.2 Optimizing steam header pressure 19.3 Optimizing steam equipment loadings 19.4 Optimizing onsite power generation versus import 19.5 Minimizing steam letdowns and venting 19.6 Optimizing steam system configuration 19.7 Developing steam system optimization model 19.8 Nomenclature 19.9 References Part 5: Retrofit project evaluation and implementation Chapter 20: Determine true benefits from OSBL 20.1 Introduction 20.2 Energy improvement options under evaluation 20.3 A method for evaluating energy improvement options in OSBL 20.4 Feasibility assessment and make decision for implementation Chapter 21: Determine true benefits from operation variations 21.1 Introduction 21.2 Collect online data for the whole operation cycle 21.3 Normal distribution and Monte Carlo simulation 21.4 Basic statistic summary for normal distribution 21.5 Nomenclature 21.6 References Chapter 22: Feasibility Assessment 22.1 Introduction 22.2 Scope and stages of feasibility assessment 22.3 Feasibility assessment methodology 22.4 Get the project basis and data right in the very beginning 22.5 Get the project economics right 22.6 Don't forget OSBL costs 22.7 Squeeze capacity out of design margin 22.8 Identify and relax plant constraints 22.9 Interactions of process conditions, yields ad equipment 22.10 Don't get misled by false balances 22.11 Prepare for fuel gas long 22.12 Two revamp cases for shifting bottlenecks 22.13 Concluding remarks 22.14 Nomenclature 22.15 References Chapter 23: Create optimization culture with measurable results 23.1 Introduction 23.2 Site wide energy optimization strategy 23.3 Case study of the site wide energy optimization strategy 23.4 Establishing energy management system 23.5 Energy operation management 23.6 Energy project management 23.7 An overall work process from idea discovery to implementation 23.8 References.

Sommario/riassunto

Exploring methods and techniques to optimize processing energy efficiency in process plants, Energy and Process Optimization for the Process Industries provides a holistic approach that considers optimizing process conditions, changing process flowschemes, modifying equipment internals, and upgrading process technology that has already been used in a process plant with success. Field tested by numerous operating plants, the book describes technical solutions to reduce energy consumption leading to significant returns on capital and includes an 8-point Guidelines for Success. The book provides managers, chemical and mechanical engineers, and plant operators with methods and tools for continuous energy and process improvements.