

PROFESSIONAL DEVELOPMENT PROGRAM

Centrifugal Compressor Design and Performance

This book provides a state-of-the-art review of the technology base of compressors and is a practical guide for designers. The author has been a major contributor to the research and development of centrifugal compressors for many years and has been responsible for a number of significant technological advances, such as the two-zone model of impeller flow, and the TEIS (two-elements-in-series) model of diffusion. Design examples from the author's vast experience are used extensively.

Foundation of Compressor Design

- Introduction
- Cycle Analysis and a Sample Design Problem Appendix 1: Cycle Codes

Impeller Flow Physics

- An Introduction to Impeller Flow States
- Impeller Secondary Flows
- Impeller Modeling and Design Possibilities
- · Impeller Exit Velocity Profiles
- Isentropic Incremental Efficiency Penalties
- · Conclusions

Appendix 1: Basic Modeling Choices

Appendix 2: Numbers Describing Rotating

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- The Role of the Diffuser in Compressor Performance
- · Vaneless Diffusers
- · Cascade (Airfoil) Diffuser Design
- Channel Diffuser Design and Performance including Rectangular, Double Divergence, and Conical Passages
- TEIS Model Applied to Channel Diffusers
- · Design Application and Modeling

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- · The Compressor Inlet
- Compressor Scroll Performance
- · Flow Collectors
- · Return Channel Performance

Stability and Range

- · Review of Steady Stall
- · Rotating Stall in Centrifugal Compressors
- · Surge Cycles and System Modeling
- · Variable Geometry and Range Extension

Summary

Appendix 1: An Alternative View of Rotating Stall

Strategies for Systematic Design and Optimization

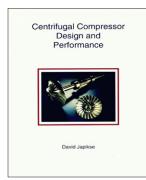
- Introduction: Design Alternatives
- · Design Optimization Strategies
- Three-Dimensional Analysis: The Design Tools and Usage
- Design Example: A Refrigeration Compressor

Centrifugal Compressor Experimental Development

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- Rotor Exit Evaluation
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- · Return Channel or Deswirl Cascades
- Volute Flow Evaluation
- · Further Interpretation of Data
- Closure

Appendix 1: Test Codes

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