

Blade Design and Analysis for Steam Turbines (Mechanical Engineering)

By Murari Singh, George Lucas

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THE LATEST STEAM TURBINE BLADE DESIGN AND ANALYTICAL TECHNIQUES

Blade Design and Analysis for Steam Turbines provides a concise reference for practicing engineers involved in the design, specification, and evaluation of industrial steam turbines, particularly critical process compressor drivers. A unified view of blade design concepts and techniques is presented. The book covers advances in modal analysis, fatigue and creep analysis, and aerodynamic theories, along with an overview of commonly used materials and manufacturing processes. This authoritative guide will aid in the design of powerful, efficient, and reliable turbines.

COVERAGE INCLUDES:

- Performance fundamentals and blade loading determination
- Turbine blade construction, materials, and manufacture
- System of stress and damage mechanisms
- Fundamentals of vibration
- Damping concepts applicable to turbine blades
- Bladed disk systems
- Reliability evaluation for blade design
- Blade life assessment aspects
- Estimation of risk

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Editorial Review

About the Author

Dr. Murari P. Singh (Bethlehem, Pennsylvania) is the President of Safe Technical Solutions, Inc (SAFETSOL). Dr. Singh has been involved in the design, development and analysis of industrial turbomachinery for more than thirty years with Turbodyne Corporation, Dresser Industries, Dresser-Rand Company, GE CONMEC and most recently with GE Oil & Gas as Consulting Engineer. Dr. Singh has extensive knowledge and experience with fatigue and fracture mechanics, stress and vibration of structures, reliability, life analysis, probabilistic analysis. His practical application experience includes a variety of rotating equipments including Warm Gas and FCC Expanders, Steam Turbines and Centrifugal Compressors. He developed the widely used SAFE diagram for reliability evaluation of turbine blades. The SAFE diagram methodology is superior to other current methods in providing clear analytical and predictive information. This concept has been applied to other turbomachineries. It is a significant contribution to design methods and vibration technology for the evaluation of turbine blade reliability. For many years, Dr. Singh has been involved in (developing and teaching) application of lifing strategy to many mechanical components, this includes hcf, lcf, creep, fracture mechanics. Probabilistic estimation is used to estimate risk in design. He is the co-author of the book "Steam Turbine, Design, Application, and Rerating", second edition published by McGraw-Hill Co.

Dr. George M. Lucas, PE, is a registered Professional Engineer with over 34 years of experience in the design, analysis and operation of steam turbines and large rotating equipment. As Director of Engineering for Dresser-Rand’s Wellsville Steam Turbine Operation, George was directly responsible for product design, steam path engineering, turbine performance, and manufacturing engineering for their custom engineered process drive steam turbines and steam turbine generators. He was directly responsible for the design of over 100 custom engineered steam turbines and contributed to the design and development of several Engineered Steam Turbine product families. Mr. Lucas was Design Project Leader for the joint Dresser-Rand/EPRI project that resulted in the successful commissioning of the 110 MW gas turbine/expander train at PowerSouth Electric Cooperative’s McIntosh Compressed Energy Storage Plant. Mr. Lucas received B. Sc. (1975) and M. Eng. (1976) degrees from Cornell University in Ithaca, New York. He holds two U.S. patents and has authored technical papers on topics including the use of advanced seals in steam turbines, compressed air energy storage and the development of advanced steam turbines for syn-gas compressor drive service. Mr. Lucas is currently an independent consultant serving OEM and end-user clients in oil and gas, power generation, and manufacturing industries.

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