Design Analysis Of Centrifugal Pump Impeller By Fea

The design and analysis of turbo-machinery are complex tasks due to the complexity of the geometry and the flow physics. The application of various computational tools to evaluate the performance of a specified geometry is commonly designated as a direct method. In a direct design approach designer's experience and talent are vital factors to reduce the number of trials while in an inverse design approach designer needs to prescribe the performance function as an input. It is often desirable to apply the inverse design approach, in which performance parameters are prescribed in the form of performance functions, the so called loading distribution, to obtain the corresponding geometry of pump as the result. At the start of an inverse design technique, the desired performance functions are prescribed as input quantities, and an initial, guessed shape of the impeller blade geometry is changed iteratively to arrive at the converged shape. The present study has developed a procedure for inverse design of a two-dimensional centrifugal pump impeller blades using the computational fluid dynamics (CFD) software, OpenFOAM (an open-source CFD software) and FLUENT. In the current work, the Gambit software is used for geometry development, domain decomposition, and grid generation. In this thesis, OpenFOAM is used to solve for the in-viscid flow in the passage formed by two adjacent blades of a pump. FLUENT is used to solve full Navier-Stokes equations to calculate blockage factor distribution along the meridional plane. The evolving blade shapes are computed by using flow tangency condition; the viscous effects in the mean flow are introduced indirectly by using the blockage effects from viscous simulations. Polynomial curve fitting techniques is used to generate the loading distribution of circulation. During each step of the current inverse design technique, the flow field analysis and blade shape calculations are performed alternately, while satisfying the boundary condition based on the loading distribution function at each step, until a fully converged solution is achieved. All the steps involved in the technique are automated by linking the individual codes in a Linux shell script. The blade shape and flow domain changes with each iteration, which means the grid also changes with each iteration. It is very time consuming to generate grid manually at each iteration, so a journal file is written in Gambit, which is executed automatically with each iteration and generates a mesh. The generated mesh is imported in OpenFOAM, where the flow analysis is done using the laplacianFOAM module of OpenFOAM, using boundary conditions based on the prescribed performance function. The tentative performance function is obtained using the circulation distribution, which is accommodated by modifying the laplacianFOAM solver. The viscous flow is solved between passages of two consecutive blades of the impeller to find the blockage factor distribution, using FLUENT. The current inverse design process is verified for a logarithmic spiral blade. Thus, the current work gives a good approach of incorporating blockage via viscous effects in the mean flow for an impeller geometry using OpenFOAM and FLUENT.

This book gives an unparalleled, up-to-date, in-depth treatment of all kinds of flow phenomena encountered in centrifugal pumps including the complex interactions of fluid flow with vibrations and wear of materials. The scope includes all aspects of hydraulic design, 3D-flow phenomena and partload operation, cavitation, numerical flow calculations, hydraulic forces, pressure pulsations, noise, pump vibrations (notably bearing housing vibration diagnostics and remedies), pipe vibrations, pump characteristics and pump operation, design of intake structures, the effects of highly viscous flows, pumping of gas-liquid mixtures, hydraulic transport of solids, fatigue damage to impellers or diffusers, material selection under the aspects of fatigue, corrosion, erosion-corrosion or hydro-abrasive wear, pump selection, and hydraulic quality criteria. As a novelty, the 3rd ed. brings a fully analytical design method for radial impellers, which eliminates the arbitrary choices inherent to former design procedures. The discussions of vibrations, noise, unsteady flow phenomena, stability, hydraulic excitation forces and cavitation have been significantly enhanced. To ease the use of the information, the methods and procedures for the various calculations and failure diagnostics discussed in the text are gathered in about 150 pages of tables which may be considered as almost unique in the open literature. The text focuses on practical application in the industry and is free of mathematical or theoretical ballast. In order to find viable solutions in practice, the physical mechanisms involved should be thoroughly understood. The book is focused on fostering this understanding which will benefit the pump engineer in industry as well as academia and students.

Specifically for the pump user, this book concentrates on the identification and solution of problems associated with existing centrifugal pumps. It gives specific examples on how to modify pump performance for increased efficiency and better quality control, which turn into long-term cost savings. Some basic theory is included to give the reader greater understanding of the problems being encountered and attacked.

Theoretical Analysis and Design of a Centrifugal Blood Pump for Optimum Blade Number and Angle

Flow Analysis of the Cleveland Clinic Centrifugal Pump

Inclusion of Blockage Effects in Inverse Design of Centrifugal Pump Impeller Blades

Hydrodynamics of Pumps

Two-dimensional Design and Analysis of Centrifugal Blood Pump Impeller

Many of the earliest books, particularly those dating back to the 1900s and before, are now extremely scarce and increasingly expensive. We are republishing these classic works in affordable, high quality, modern editions, using the original text and artwork.

Rely on the #1 Guide to Pump Design and Application-- Now Updated with the Latest Technological Breakthroughs Long-established as the leading guide to pump design and application, the Pump Handbook has been fully revised and updated with the latest developments in pump technology. Packed with 1,150 detailed illustrations and written by a team of over 100 internationally renowned pump experts, this vital tool shows you how to select, purchase, install, operate, maintain, and troubleshoot cutting-edge pumps for all types of uses. The Fourth Edition of the Pump Handbook features: State-of-the-art guidance on every aspect of pump theory, design, application, and technology Over 100 internationally renowned contributors SI units used throughout the book New sections on centrifugal pump mechanical performance, flow analysis, bearings, adjustable-speed drives, and application to cryogenic LNG services; completely revised sections on pump theory, mechanical seals, intakes and suction piping, gears, and waterhammer; application to pulp and paper mills Inside This Updated Guide to Pump Technology • Classification and Selection of Pumps • Centrifugal Pumps • Displacement Pumps • Solids Pumping • Pump Sealing • Pump Bearings • Jet Pumps • Materials of Construction • Pump Drivers and Power Transmission • Pump Noise • Pump Systems • Pump Services • Intakes and Suction Piping • Selecting and Purchasing Pumps • Installation, Operation, and Maintenance • Pump Testing • Technical Data

Practical Centrifugal Pumps is a comprehensive guide to pump construction, application, operation, maintenance and management issues. Coverage includes pump classifications, types and criteria for selection, as well as practical information on the use of pumps, such as how to read pump curves and cross reference. Throughout the book the focus is on best practice and developing the skills and knowledge required to recognise and solve pump problems in a structured and confident manner. Case studies provide real-world scenarios covering the design, set up, troubleshooting and maintenance of pumps. · A comprehensive guide to pump construction, design, installation, operation, troubleshooting and maintenance. · Develop real-world knowhow and practical skills through seven real-world case studies · Coverage includes pump classifications, types and criteria for selection, as well as practical information on the use of pumps

Design, Analysis, and Applications

Centrifugal and Axial Flow Pumps

Centrifugal Pumps, Hydraulic Design

Recent Progress in Pump Research, December 10-14, 1973

Design, Modeling and Reliability in Rotating Machinery

This book is both a state-of-the-art review of centrifugal pump technology and a practical guide to designers. Continuous development over a period of several decades has led to a rational approach to the understanding, design, and development of centrifugal pumps. Many aspects of this consistent approach are outlined in this book. Detailed description of all the important elements of a pump stage are included. Particular attention is paid to the impeller and the diffuser, which are the key elements in achieving the necesary head rise. Inlets, volutes, collectors, and return channels are also discussed in depth. Extensive use is made of the graphs, line drawings, and photographs. The text includes several hundred references which cover all of the important developments int the technology base over the past forty years. Computational fluid dynamics (CFD) and experimental testing are emphasized as essentials parts of the design review process. [Source : d'après la 4e de couverture].

An engineer's guide to the design, selection, operation and maintenance of centrifugal pumps. Author Moniz Senior Hospital Engineer for the Government of Western Australia.

Hydrodynamics of Pumps is a reference for pump experts and a textbook for advanced students. It examines the fluid dynamics of liquid turbomachines, particularly pumps, focusing on special problems and design issues associated with the flow of liquid through a rotating machine. There are two characteristics of a liquid that lead to problems and cause a significantly different set of concerns than those in gas turbines. These are the potential for cavitation and the high density of liquids, which enhances the possibility of damaging, unsteady flows and forces. The book begins with an introduction to the subject, including cavitation, unsteady flows and turbomachinery, basic pump design and performance principles. Chapter topics include flow features, cavitation parameters and inception, bubble dynamics, cavitation effects on pump performance, and unsteady flows and vibration in pumps - discussed in the three final chapters. The book is richly illustrated and includes many practical examples.

Centrifugal and Axial Pump Design and Off-design Performance Prediction

Problem Analysis and Troubleshooting

Design Guidelines for Quiet Fans and Pumps for Space Vehicles

Centrifugal Pumps: Design and Application

How to Select the Right Centrifugal Pump

1,1 Applications of Slurry Transport Vast tonnages are pumped every year in the form of solid-liquid mixtures, known as slurries. The application which involves the largest quantities is the dredging industry, continually maintaining navigation in harbours and rivers, altering coastlines and winning material for landfill and construction purposes. As a single dredge may be required to maintain a throughput of 7000 tonnes of slurry per hour or more, very large centrifugal pumps are used. Figures 1-1 and 1-2 show, respectively, an exterior view of this type of pump, and a view of a large dredge-pump impeller (Addie & Helmley, 1989). The manufacture of fertiliser is another process involving massive slur- transport operations. Li Florida, phosphate matrix is recovered by huge draglines in open-pit mining operations. It is then slurried, and pumped to the wash plants through pipelines with a typical length of about 10 kilometres. Each year some 34 million tonnes of matrix are transported in this manner. This industry employs centrifugal pumps that are generally smaller than those used in large dredges, but impeller diameters up to 1. 4 m are common, and drive capacity is often in excess of 1000 kW. The transport distance is typically longer than for dredging applications, and Chapter 1 Figure LI. Testing a dredge pump at the GIW Hydraulic Laboratory Figure 1. 2. Impeller for large dredge pump 1. Introduction 3 hence a series of pumping stations is often used. Figure 1-3 shows a boost- pump installation in a phosphate pipeline.

Centrifugal Pump DesignJohn Wiley & Sons

The final chapter introduces the industrial codes and practices that must also be taken into account in finalising any pump design. This text will be of interest to graduate students, research and professional designers in mechanical, aeronautical, chemical and civil engineering.

Practical Centrifugal Pumps

Centrifugal & Rotary Pumps

Design of Hydrodynamic Machines

(Centrifugal and Axial)

Pumps are commonly encountered in industry and are essential to the smooth running of many industrial complexes. Mechanical engineers entering industry often have little practical experience of pumps and their problems, and need to build up an understanding of the design, operation and appropriate use of pumps, plus how to diagnose faults and put them right. This book tackles all these aspects in a readable manner, drawing on the authors' long experience of lecturing and writing on centrifugal pumps for industrial audiences.

Centrifugal Pumps: Design and Application, Second Edition focuses on the design of chemical pumps, composite materials, manufacturing techniques employed in nonmetallic pump applications, mechanical seals, and hydraulic design. The publication first offers information on the elements of pump design, specific speed and modeling laws, and impeller design. Discussions focus on shape of head capacity curve, pump speed, viscosity, specific gravity, correction for impeller trim, model law, and design suggestions. The book then takes a look at general pump design, volute design, and design of multi-stage casing. The manuscript examines double-suction pumps and side-suction design, net positive suction head, and vertical pumps. Topics include configurations, design features, pump vibration, effect of viscosity, suction piping, high speed pumps, and side suction and suction nozzle layout. The publication also ponders on high speed pumps, double-case pumps, hydraulic power recovery turbines, and shaft design and axial thrust. The book is a valuable source of data for pump designers, students, and rotating equipment engineers.

**** A desktop sourcebook for those who deal with pumps and pumping systems on a daily basis--covers design, application, and pumped water systems***

Fundamentals With Applications

Rotodynamic Pumps

The Analysis and Design of Large Centrifugal Pump Inlets

Advances of CFD in Fluid Machinery Design

Inverse Design of Two-dimensional Centrifugal Pump Impeller Blades Using Inviscid Analysis and Openfoam

Choosing a centrifugal pump from the countless options available can be daunting, but someone has to make the decision. Many factors -such as the required flow, differential pressure, suction conditions, etc.- must be weighed against the capital costs and cost of energy for the pumps considered. To determine the right pump, you must consider the overall cost of ownership, which includes capital cost, operating costs, and maintenance cost. What good is a low cost pump if it is inefficient or if is costly to maintain? The selection methodology offered in this book focuses mainly on hydraulic design considerations, but it also touches on mechanical design details. Analyzing basic pump hydraulic parameters allows you to quickly determine if a centrifugal pump makes sense for your particular application. If you do decide a centrifugal pump will work for your application, then you need to be able to evaluate the various bids returned by pump manufacturers. A complete chapter is devoted to tabulating quotes from pump manufacturers in order to properly evaluate their bids and select the best overall option.

A hands-on, applications-based approach to the design and analysis of commonly used centrifugal pumps Centrifugal Pump Design presents a clear, practical design procedure that is solidly based on theoretical fluid dynamics fundamentals, without requiring higher math beyond algebra. Intended for use on the factory floor, this book offers a short, easy-to-read description of the fluid mechanic phenomena that occur in pumps, including those revealed by the most recent research. The design procedure incorporates a simple computer program that allows designs to be checked immediately and corrected as needed; readers learn to calibrate the performance calculation program based on their own test data. Other important features of this book include: * Up-to-date coverage of detailed design data * Guidance on selection, troubleshooting, and modification of existing pumps * A numerical example illustrating the design of a pump as readers move through the book * Manual calculations-including worked examples-and personal computer program listings critical to pump design * Ample references to all subjects for further study This unique handbook closes the gap between research and application and puts the fundamentals of advanced fluid mechanics where they will do the most good: in the hands of engineers, teachers, and designers who create industrial pumps.

The success of any product sold to consumers is based, largely, on the longevity of the product. This concept can be extended by various methods of improvement including optimizing the initial creation structures which can lead to a more desired product and extend the product's time on the market. Design and Optimization of Mechanical Engineering Products is an essential research source that explores the structure and processes used in creating goods and the methods by which these goods are improved in order to continue competitiveness in the consumer market. Featuring coverage on a broad range of topics including modeling and simulation, new product development, and multi-criteria decision making, this publication is targeted toward students, practitioners, researchers, engineers, and academicians.

A Computational Package to Aid the Design and to Evaluate Centrifugal Turbopumps

Centrifugal Pump User's Guidebook

Radial Flow Turbocompressors

Water Pumps and Pumping Systems

Centrifugal Pump Design and Performance

Centrifugal Pumps describes the whole range of the centrifugal pump (mixed flow and axial flow pumps are dealt with more briefly), with emphasis on the development of the boiler feed pump. Organized into 46 chapters, this book discusses the general hydrodynamic principles, performance, dimensions, type number, flow, and efficiency of centrifugal pumps. This text also explains the pumps performance; entry conditions and cavitation; speed and dimensions for a given duty; and losses. Some chapters further describe centrifugal pump mechanical design, installation, monitoring, and maintenance. The various types and applications of pumps in the light of the particular design features involved are addressed in other chapters. This book is authoritative, informative, and thought-provoking to an exceptional extent. It establishes a notable advance in the progress of the art of the designer and manufacturer of centrifugal pumps, to the material advantage of the user.

Inverse design of centrifugal pump impeller blades is a widely used technique for designing pump blades. In a typical Computational Fluid Dynamics (CFD) analysis, the geometry (flow domain) is prescribed, and the governing equations are solved over the flow domain, subject to appropriate boundary conditions. In the inverse design technique, the geometry is unknown, while the desired flow field characteristics on the geometry (blades of pump impeller) are prescribed. Starting with an initial guess for the blade shape, the final shape of the blades is obtained iteratively. The present work uses OpenFOAM, an open source CFD software, which solves the governing equations using a finite-volume method (FVM) for the inverse design of two-dimensional centrifugal pump impeller blades. A CFD analysis using FVM requires mesh to be of good quality. Since the pump blade has high curvature, careful consideration has to be given while generating the mesh. The present work explains the geometry generation and meshing of the geometry, to obtain a good quality mesh in the Gambit software. The inverse design technique in the present study is based on assumption of a potential flow field. In the potential flow analysis of pumps, the circulation generated by a pump is an unknown. This unknown appears in a boundary condition downstream of the blade. An iterative method has been implemented in OpenFOAM for calculating the circulation. The circulation value calculated using OpenFOAM compares well with analytical value of circulation generated for the test case of an impeller with logarithmic spiral blades. A grid-independence study shows that, as the grid is refined, the value of the circulation generated by the pump impeller approaches the analytical value. Inverse design is an iterative process, which is carried out till a converged blade shape is obtained, while satisfying the prescribed flow characteristics. For every new shape generated during iteration, the geometry creation and grid generation are automated using a Journal file in Gambit. The mesh is then imported in OpenFOAM. Inverse design of a pump blade requires specification of swirl distribution along the blade. To accommodate this swirl distribution in the boundary condition on the blade, the OpenFOAM code is modified. The iterative process has been automated, and linked with Gambit, using a Linux shell script. The implementation of the present inverse design process in OpenFOAM is verified for a two-dimensional case. The swirl distribution generated on the blade is calculated by analyzing potential flow in a blade-to-blade channel for an assumed blade shape. This swirl distribution is then imposed on a flat blade, and the inverse design iterations are carried out, till a converged blade shape is obtained. This inverse design blade shape matches closely with the assumed shape of the blade. The method is further used to redesign a blade which has non-zero incident flow at the leading edge. The inverse design method redesigns the blade such that the flow is tangential to the blade at leading edge. Following chapters explain the implementation of inverse design method using Gambit and OpenFOAM.

An introduction to the theory and engineering practice that underpins the component design and analysis of radial flow turbocompressors. Drawing upon an extensive theoretical background and years of practical experience, the authors provide descriptions of applications, concepts, component design, analysis tools, performance maps, flow stability, and structural integrity, with illustrative examples. Features wide coverage of all types of radial compressor over many applications unified by the consistent use of dimensional analysis. Discusses the methods needed to analyse the performance, flow, and mechanical integrity that underpin the design of efficient centrifugal compressors with good flow range and stability. Includes explanation of the design of all radial compressor components, including inlet guide vanes, impellers, diffusers, volutes, return channels, de-swirl vanes and side-streams. Suitable as a reference for advanced students of turbomachinery, and a perfect tool for practising mechanical and aerospace engineers already within the field and those just entering it.

Problems and Solutions

A Brief Survey of Centrifugal Pump Selection Best Practices

Quasi-three-dimensional Analysis and Design Process for Centrifugal Pump Impellers

Pumps and Hydro-Turbines

Centrifugal Pumps

Design of Hydrodynamic Machines provides a broad, yet concise, theoretical background on the relationship between fluid dynamics and geometry. It covers the most important types of turbomachinery used in power generation industrial processes, utilities, and the oil and gas industry. Offering guidance on the hydraulic design aspect of different parts of turbomachinery, such as impellers, diffusers, volute casing, inlet and outlets, the book discusses how to conduct performance characteristics testing and evaluate performance parameters of the designed parts. It also covers aspects of CFD of turbomachinery. Readers will be able to perform hydraulic design of important turbomachinery parts using commercially available software. Intended for final year undergraduates and postgraduates in mechanical, civil, and aeronautical engineering, the book will also be useful for those involved in the hydraulic design, analysis, and testing of turbomachinery.

Rotating machinery represents a broad category of equipment, which includes pumps, compressors, fans, gas turbines, electric motors, internal combustion engines, and other equipment, that are critical to the efficient operation of process facilities around the world. These machines must be designed to move gases and liquids safely, reliably, and in an environmentally friendly manner. To fully understand rotating machinery, owners must be familiar with their associated technologies, such as machine design, lubrication, fluid dynamics, thermodynamics, rotordynamics, vibration analysis, condition monitoring, maintenance practices, reliability theory, and other topics. The goal of the "Advances in Rotating Machinery" book series is to provide industry practitioners a time-savings means of learning about the most up-to-date rotating machinery ideas and best practices. This three-book series will cover industry-relevant topics, such as design assessments, modeling, reliability improvements, maintenance methods and best practices, reliability audits, data collection, data analysis, condition monitoring, and more. This first volume begins the series by focusing on rotating machinery design assessments, modeling and analysis, and reliability improvement ideas. This broad collection of current rotating machinery topics, written by industry experts, is a must-have for rotating equipment engineers, maintenance personnel, students, and anyone else wanting to stay abreast with current rotating machinery concepts and technology.

In the past Computational Fluid Dynamics (CFD) was confined to large organisations capable of developing and supporting their own codes. But recently there has been a rapid increase in the availability of reasonably priced commercial codes, and many more industrial organisations are now able to routinely use CFD. Advances of CFD in Fluid Machinery Design provide the perfect opportunity to find out what industry is doing and this book addresses how CFD is now being increasingly used in the design process, rather than as a post-design analysis tool. COMPLETE CONTENTS Trends in industrial use of CFD Challenges and methodologies in the design of axial flow fans for high-bypass-ratio, gas turbine engines using steady and unsteady CFD A three-dimensional inverse method based on pressure loading for the design of turbomachinery blades Application of CFD to the design and analysis of axial and centrifugal fans and compressors The design and performance of a transonic flow deswirling system - an application of current CFD design techniques tested against model and full-scale experiments Recent developments in unsteady flow modelling for turbomachinery aeroelasticity Computational investigation of flow in casing treatments for stall delay in axial flow fans Use of CFD for the three-dimensional hydrodynamic design of vertical diffuser pumps Recommendations to designers for CFD pump impeller and diffuser simulations Three dimensional CFD - a possibility to analyse piston pump flow dynamics CFD analysis of screw compressor performance Prediction of aerothermal phenomena in high-speed discstator systems Use of CFD in the design of a shaft seal for high-performance turbomachinery Users and potential users, of CFD for the design of fluid machinery, managers, designers, and researchers working in the field of 'industrial flows', will all find Advances of CFD in Fluid Machinery Design a valuable volume discussing state-of-the-art developments in CFD.

Slurry Transport Using Centrifugal Pumps

Centrifugal Pump Design

Sulzer Centrifugal Pump Handbook

Pump Handbook

Study of Volute Design Methods with Emphasis on Wide Passage Volutes Typical of Slurry Pumps

This document presents guidelines for the design of quiet fans and pumps of the class used on space vehicles. A simple procedure is presented for the prediction of fan noise over the meaningful frequency spectrum. A section also presents general design criteria for axial flow fans, squirrel cage fans, centrifugal fans, and centrifugal pumps. The basis for this report is an experimental program conducted by Hamilton Standard under NASA Contract NAS 9-12457. The derivations of the noise predicting methods used in this document are explained in Hamilton Standard Report S dated May 1973 (6). Lovell, John S. and Magliozzi, Bernard Glenn Research Center; Johnson Space Center FAN BLADES; VENTILATION; AERODYNAMIC NOISE; AXIAL FLOW; CENTRIFUGAL PUMPS; DESIGN ANALYSIS; NOISE PREDICTION; FREQUENCY DISTRIBUTION; PUMPS

In the critical work of maintaining power plant machinery, operating difficulties with centrifugal pumps will inevitably occur because of the essential requirement for electric power plants to operate at all times throughout the year. The root causes and solutions for pump failure comprise major areas of study for engineers in seeking the highest availability of electricity-generating units, extending time between major machinery overhauls and providing early detection of potential failure modes well in advance of machine degradation. This guide for engineers provides a comprehens centrifugal pumps, addressing the range of pump operating problems encountered in both fossil and nuclear power plants. The book is divided into three sequential parts: Part I - Primer on Centrifugal Pumps, Part II -Power Plant Centrifugal Pump Applications, and Part III - Trouble-Shooting Case Studies. Employing effective research models developed through years of experience, the author draws on an extensive range of scholarship that covers the detrimental impact of power plant pump failures on overall plant performance, as well as the preventative measures that aid i covering the performance and components of centrifugal pumps, operating failure modes are covered both for fossil and nuclear power plants. This is followed by the presentation of several power plant pump troubleshooting case studies. The text also walks readers through the various other industrial applications of centrifugal pumps, as in their use within petrochemical plants and in ocean vessel propulsion systems. Recognizing the warning signs of specific impending pump failure modes is essential to minimizing the financial costs of dealing with pump operating problems. theoretical models and relevant examples in support of the essential work of power plant pump use and maintenance:

"The CPAC(Centrifugal Pump Analysis Code) is a one-dimensional meanline pump analysis code which predicts performances of centrifugal pumps at design and off-design conditions based on pump geometries and operating conditions. The PC version of the CPAC is based on Loss Isolation Code (LSISO) which was written in the early 1970s for NASA Lewis Research Center and the code developed previously at RIT which runs on VAX/VMS environment. This new version of CPAC is written with Visual Basic Programming language to work on personal computers. CPAC online help manual. The following enhancements were made over previously existing codes Additional features: * Additional pump elements * Nodes based modeling scheme * Individual or multiple elements analysis * Constants or variable fluid properties * English or SI umt input/output * User-friendly interface incorporating - various input options - on-screen input editing - graphical and tabular output displays - graphical and tabular print-outs * Personal computer based software * Reusability of the code Along with online help and the user's manual for program usage make th centrifugal turbopump design performance prediction and evaluation. It also offers the capability of predicting other pump configurations such as vaneless diffuser pumps, vaned diffuser pumps, volute pumps, single and multistage pumps, including the crossover elements (turning channel and downcomer) Comparisons of the CPAC predictions to experimental test data for several turbopumps and industrial pumps over a wide range of pump operating speed and flow rates were made, and the results were acceptable as a performance prediction code."--Abstract.

Design, Operation and Maintenance

Theory, Design, and Application

Centrifugal and Other Rotodynamic Pumps

Design and Optimization of Mechanical Engineering Products

Know and Understand Centrifugal Pumps

Detailed information about the theory, design, testing and analysis of centrifugal, radial, diagonal and axial types of pumps presented.Design explained with structures and relevant calculations.Language is kept simple and in lucid style.Real working models with design discussed for better comprehension of the subject.ABOUT THE BOOK:Knowledge of the basic fundamentals, design, efficiency calculation and technology of pumps is quite essential in various types of industries. This book Rotodynamic Pumps (Centrifugal and Axial) has been designed keeping this in view. Written by a competent person in the subject, the book provides a detailed information about the theory, design, testing, analysis and operation of different types of rotodynamic pumps, namely centrifugal, radial, diagonal and axial flow types. It helps the readers to design, analyse and regulate the pumps. It details the complete design process, losses and efficiency calculation, computer programmes. Working models have been fully illustrated in the book for better comprehension of the subject.

All the experience of the research team from one of the world's foremost pump manufacturers - Sulzer, featuring the lastest in pump design and construction.

Centrifugal and Rotary Pumps offers both professionals and students a concise reference detailing the design, performance, and principles of operation of the different pumps types defined by the Hydraulic Institute. From historical background to the latest trends and technological developments, the author focuses on information with real-world prac

Rotodynamic Pump Design

Design Analysis of a Prepackaged Nuclear Power Plant (1000 EKW).: Primary and secondary system design

Power Plant Centrifugal Pumps