mechanical seal vs packing

mechanical seal vs packing is a critical comparison in the field of industrial sealing solutions, especially for pumps, mixers, and rotating equipment. Both mechanical seals and packing serve the primary function of preventing fluid leakage along a rotating shaft, but they operate based on different principles and offer distinct advantages and disadvantages. Understanding the differences, applications, and performance characteristics of mechanical seals versus packing is essential for engineers, maintenance professionals, and procurement specialists aiming to optimize equipment reliability and operational efficiency. This article provides a comprehensive analysis of mechanical seal vs packing, covering design features, installation, maintenance requirements, cost implications, and environmental impact. It also highlights scenarios where one solution may outperform the other, helping stakeholders make informed decisions. The following sections delve into detailed comparisons, ensuring a thorough grasp of these two prevalent sealing technologies.

Overview of Mechanical Seals

Mechanical seals are advanced sealing devices designed to contain fluid within pumps, mixers, and other rotating equipment by creating a tight seal between the rotating shaft and the stationary housing. They consist of two primary components: a rotating ring attached to the shaft and a stationary ring fixed to the equipment housing. These rings are typically made of hard materials such as carbon, ceramic, or tungsten carbide and are precisely lapped to create a smooth sealing surface.

Design and Components

The design of mechanical seals includes several key components that work together to prevent leakage. In addition to the primary sealing rings, mechanical seals feature secondary elements such as O-rings, springs, bellows, and gland plates. These components help maintain contact between the sealing faces, accommodate shaft movement, and provide flexibility under varying operational conditions.

Working Principle

Mechanical seals operate by maintaining a thin film of fluid between the rotating and stationary faces, which reduces friction and wear. This hydrodynamic film ensures minimal leakage and extends the seal's operational life. Mechanical seals can be single or double, with double seals offering enhanced protection for hazardous or high-pressure applications.

Overview of Packing Seals

Packing seals, also known as gland packing or braided packing, are one of the oldest and most traditional sealing methods used in rotating equipment. They consist of a ring or set of rings made from fibrous materials such as graphite, PTFE, cotton, or synthetic fibers, which are packed into a stuffing box around the shaft.

Design and Materials

Packing materials are typically braided or molded into rings that fit tightly within the stuffing box. The packing is compressed by a gland follower, which applies pressure to create a seal against the shaft. The choice of packing material depends on the fluid type, temperature, pressure, and shaft speed.

Working Principle

The packing seal works by providing a barrier that restricts fluid flow along the shaft. Some leakage is generally expected and necessary to lubricate and cool the packing material, preventing excessive wear. Proper adjustment of the gland follower is essential to balance sealing performance and packing life.

Comparison of Mechanical Seal vs Packing

Understanding the distinctions between mechanical seal vs packing is vital for selecting the appropriate sealing solution. The following comparison highlights the critical factors that differentiate these two sealing methods.

Leakage Control

Mechanical seals are designed to provide near-zero leakage under optimal conditions, making them suitable for applications requiring tight containment of fluids. Packing seals, by contrast, allow controlled leakage to lubricate the packing material, which can lead to higher fluid loss and potential environmental concerns.

Maintenance Requirements

Packing seals require frequent inspection and adjustment to maintain effective sealing and prevent excessive wear. Over time, packing must be replaced, and improper gland tightening can lead to shaft damage. Mechanical seals generally require less frequent maintenance, although they may need periodic inspection, especially in demanding conditions.

Installation Complexity

Installing packing is relatively straightforward and does not require specialized skills or equipment. Mechanical seals, however, necessitate precise installation procedures, alignment, and sometimes specialized tools, which can increase installation time and cost.

Durability and Lifespan

Mechanical seals typically offer longer operational lifespans due to superior materials and design, especially in high-speed or high-pressure environments. Packing seals tend to wear out faster, especially in abrasive or corrosive conditions, leading to more frequent replacements.

Operational Costs

While packing seals have a lower upfront cost, their frequent maintenance and replacement can result in higher lifecycle expenses. Mechanical seals generally have a higher initial investment but lower operational and maintenance costs over time.

- Mechanical seals provide superior sealing with minimal leakage.
- Packing seals are simpler and less expensive initially.
- Mechanical seals require more precise installation.
- Packing necessitates regular adjustments and replacements.
- Mechanical seals typically last longer, reducing downtime.

Applications and Suitability

The choice between mechanical seal vs packing depends on the specific requirements of the application, including fluid characteristics, pressure, temperature, and environmental considerations.

Mechanical Seal Applications

Mechanical seals are widely used in industries such as chemical processing, oil and gas, pharmaceuticals, and power generation where leak prevention is critical. They perform well under high pressure, high temperature, and corrosive or hazardous fluid conditions. Mechanical seals are also preferred in applications demanding strict environmental compliance and safety standards.

Packing Seal Applications

Packing seals remain popular in less demanding applications or where budget constraints exist. They are suitable for water pumps, HVAC systems, and general industrial equipment where minor leakage is acceptable. Packing is also favored in applications where equipment downtime must be minimized due to the ease of replacement.

Maintenance and Operational Considerations

Maintenance strategies differ significantly between mechanical seal vs packing, impacting operational efficiency and equipment reliability.

Mechanical Seal Maintenance

Mechanical seals require careful monitoring of seal face condition, lubrication, and alignment. Routine inspections can identify early signs of wear or failure. Seal flush systems may be necessary to maintain optimal operating conditions, especially in dirty or abrasive environments.

Packing Seal Maintenance

Packing requires regular gland adjustments to maintain the correct compression level. Excessive tightening can cause shaft wear, while insufficient compression results in increased leakage. Packing replacement intervals vary with operating conditions but generally occur more frequently than mechanical seal replacements.

Cost Analysis and Environmental Impact

Economic and environmental factors play a crucial role in the decision-making process for mechanical seal vs packing selection.

Cost Considerations

The initial cost of mechanical seals is higher, including purchase price and installation expenses. However, their extended service life and reduced downtime often result in lower total cost of ownership. Packing seals offer lower upfront costs but incur higher operational costs due to frequent maintenance, fluid loss, and potential equipment wear.

Environmental Impact

Mechanical seals contribute to environmental protection by minimizing fluid leakage, reducing hazardous waste, and improving workplace safety. Packing seals, due to inevitable leakage, may pose environmental and health risks, especially when sealing toxic or polluting fluids. Regulatory compliance increasingly favors mechanical seals in sensitive applications.

Frequently Asked Questions

What is the main difference between a mechanical seal and packing?

The main difference is that a mechanical seal uses a rotating and stationary face to create a seal, while packing uses braided or twisted material compressed around the shaft to prevent leakage.

Which is more reliable, mechanical seals or packing?

Mechanical seals are generally more reliable as they provide a better seal, reduce leakage, and require less maintenance compared to packing.

How does the maintenance frequency compare between mechanical seals and packing?

Packing requires more frequent adjustment and replacement due to wear and leakage, whereas mechanical seals typically need less frequent maintenance.

Are mechanical seals more expensive than packing?

Yes, mechanical seals usually have a higher initial cost compared to packing, but they often offer cost savings over time due to lower maintenance and downtime.

Can packing be used in high-pressure applications instead of mechanical seals?

Packing can be used in some high-pressure applications but is less effective and less reliable than mechanical seals, which are better suited for high-pressure environments.

Do mechanical seals reduce environmental pollution compared to packing?

Yes, mechanical seals minimize leakage and emissions, making them more environmentally friendly compared to packing that can allow fluid leaks.

Is installation more complex for mechanical seals or packing?

Mechanical seals generally require more precise installation and alignment than packing, which is simpler to install but less precise.

Which sealing method offers better performance at high temperatures?

Mechanical seals typically perform better at high temperatures because they are designed with materials that can withstand thermal stress better than packing.

Can mechanical seals be used in corrosive environments better than packing?

Yes, mechanical seals are often made from corrosion-resistant materials, making them more suitable for corrosive environments compared to traditional packing.

Additional Resources

1. *Mechanical Seals: Principles and Applications*
This book offers a comprehensive overview of mechanical seal technology, detailing the design, operation, and maintenance of seals used in various industrial applications. It contrasts mechanical seals with traditional packing methods, highlighting the advantages and limitations of each. Readers will gain insights into seal selection criteria and troubleshooting techniques.

2. *Packing vs. Mechanical Seals: A Comparative Study*
Focusing specifically on the debate between packing and mechanical seals, this book provides an in-depth comparative analysis. It discusses the historical use of packing, its performance issues, and how mechanical seals have evolved to address these challenges. Case studies illustrate practical scenarios where one method may be favored over the other.

3. *Sealing Solutions for Rotating Equipment*
This title delves into various sealing technologies used in pumps, compressors, and mixers, including both packing and mechanical seals. It examines the operational principles, installation procedures, and maintenance requirements of each sealing type. The book also covers recent innovations and best practices in seal management.

4. *Industrial Pump Sealing: Mechanical Seals and Packing Explained*
Designed for engineers and technicians, this book explains the fundamentals of sealing in industrial pumps, comparing the roles of packing and mechanical seals. It includes practical guidance on selection, installation, and failure analysis. The content is enriched with diagrams and real-world examples for better understanding.

5. *Advanced Mechanical Seals and Packing Techniques*
This book explores advanced concepts and modern techniques in sealing technology. It covers materials, design improvements, and performance enhancements in both mechanical seals and packing. Readers will find detailed discussions on how to optimize seal life and reliability in demanding environments.

6. *The Engineering Guide to Shaft Sealing: Packing and Mechanical Seals*
Providing an engineering perspective, this guide breaks down the mechanical, thermal, and chemical considerations in shaft sealing. It compares the effectiveness of packing and mechanical seals across different industries. The book also offers troubleshooting tips and maintenance schedules to ensure optimal sealing performance.

7. *Sealing Technology in Fluid Handling Systems*
This book covers the broad spectrum of sealing technologies used in fluid handling, with special emphasis on the pros and cons of packing versus mechanical seals. It addresses the impact of fluid properties, pressure, and temperature on seal selection. Engineers will find valuable information on improving system efficiency through proper sealing.

8. *Maintenance and Reliability of Mechanical Seals and Packing*
Focusing on maintenance strategies, this book guides readers on how to extend the service life of both mechanical seals and packing. It discusses common failure modes and preventive measures, supported by case studies and troubleshooting methodologies. The book aims to reduce downtime and maintenance costs through effective seal management.

9. *Practical Handbook on Mechanical Seals and Packing for Engineers*
This practical handbook is tailored for engineers seeking hands-on knowledge about sealing solutions. It provides step-by-step instructions for installation, inspection, and replacement of mechanical seals and packing. Additionally, it compares their performance in various industrial applications, helping readers make informed decisions.

Mechanical Seal Vs Packing

mechanical seal vs packing: Shale Shakers and Drilling Fluid Systems Gulf Publishing Company, American Association of Drilling Engineers, 1999 Introduction. Shale shaker design. Shale shaker selection. Cascade systems. Dry shakers. Shaker user's guide. Non-oilfield uses. Screen cloth. Screen panel technology. Appendixes: Solids control equipment. Dilution. Cutpoints. Comparison of shaker performances. Calculating drilled solids concentrations. Centrifugal pumps. Electric motors. Dewatering. API 13C. Pre-well checklist. Troubleshooting guide. Glossary. Shaker specifications.

Shaker manufacturers. Screen manufacturers. Derrickman's pages.

mechanical seal vs packing: Process Plant Equipment Michael D. Holloway, Chikezie Nwaoha, Oliver A. Onyewuenyi, 2012-08-20 “Process Plant Equipment Book is another great publication from Wiley as a reference book for final year students as well as those who will work or are working in chemical production plants and refinery...” -Associate Prof. Dr. Ramli Mat, Deputy Dean (Academic), Faculty of Chemical Engineering, Universiti Teknologi Malaysia “...give[s] readers access to both fundamental information on process plant equipment and to practical ideas, best practices and experiences of highly successful engineers from around the world... The book is illustrated throughout with numerous black & white photos and diagrams and also contains case studies demonstrating how actual process plants have implemented the tools and techniques discussed in the book. An extensive list of references enables readers to explore each individual topic in greater depth...” –Stainless Steel World and Valve World, November 2012 Discover how to optimize process plant equipment, from selection to operation to troubleshooting From energy to pharmaceuticals to food, the world depends on processing plants to manufacture the products that enable people to survive and flourish. With this book as their guide, readers have the information and practical guidelines needed to select, operate, maintain, control, and troubleshoot process plant equipment so that it is efficient, cost-effective, and reliable throughout its lifetime. Following the authors' careful explanations and instructions, readers will find that they are better able to reduce downtime and unscheduled shutdowns, streamline operations, and maximize the service life of processing equipment. Process Plant Equipment: Operation, Control, and Reliability is divided into three sections: Section One: Process Equipment Operations covers such key equipment as valves, pumps, cooling towers, conveyors, and storage tanks Section Two: Process Plant Reliability sets forth a variety of tested and proven tools and methods to assess and ensure the reliability and mechanical integrity of process equipment, including failure analysis, Fitness-for-Service assessment, engineering economics for chemical processes, and process component function and performance criteria Section Three: Process Measurement, Control, and Modeling examines flow meters, process control, and process modeling and simulation Throughout the book, numerous photos and diagrams illustrate the operation and control of key process equipment. There are also case studies demonstrating how actual process plants have implemented the tools and techniques discussed in the book. At the end of each chapter, an extensive list of references enables readers to explore each individual topic in greater depth. In summary, this text offers students, process engineers, and plant managers the expertise and technical support needed to streamline and optimize the operation of process plant equipment, from its initial selection to operations to troubleshooting.

mechanical seal vs packing: Operator's Guide to Rotating Equipment Julien LeBleu, Jr. and Robert Perez, 2014-05 Every operator who is responsible for monitoring critical rotating equipment will greatly benefit from this handy reference book. The goal of this book is to present proven techniques that will enable rookie and veteran operators alike to detect problems early and, we hope, eliminate major outages and/or maintenance costs. To achieve this goal we shall explain the basics of lubrication systems, bearings, drivers, seals and sealing systems, for centrifugal and positive displacement pumps as well as turbines, centrifugal compressors and reciprocating compressors. We will then present common sense inspection methods for centrifugal and positive displacement pumps, gear boxes, motors, heat exchangers, and turbines.

mechanical seal vs packing: *Seals and Sealing Handbook* Robert K. Flitney, 2014-06-13 Seals and Sealing Handbook, Sixth Edition provides comprehensive coverage of sealing technology, bringing together information on all aspects of this area to enable you to make the right sealing choice. This includes detailed coverage on the seals applicable to static, rotary and reciprocating applications, the best materials to use in your sealing systems, and the legislature and regulations that may impact your sealing choices.Updated in line with current trends this updated reference provides the theory necessary for you to select the most appropriate seals for the job and with its 'Failure Guide', the factors to consider should anything go wrong. Building on the practical, stepped approach of its predecessor, Seals and Sealing Handbook, 6th Edition remains an essential

reference for any engineer or designer who uses seals in their work. - A comprehensive reference covering a broad range of seal types for all situations, to ensure that you are able to select the most appropriate seal for any given task - Includes supporting case studies and a unique 'Failure Guide' to help you troubleshoot if things go wrong - New edition includes the most up-to-date information on sealing technology, making it an essential reference for anyone who uses seals in their work

mechanical seal vs packing: ASHRAE Handbook & Product Directory , 1975

mechanical seal vs packing: HVAC and Chemical Resistance Handbook for the Engineer and Architect Tom Arimes, 1994 The title is misleading until you check out the contents. It is all about HVAC and more. This compilation has organized data frequently used by Mechanical Engineers, Mechanical Contractors and Plant Facility Engineers. The book will end the frustration on a busy day searching for design criteria.

mechanical seal vs packing: Fluid Power Troubleshooting, Second Edition, Anton Hehn, 2021-05-27 Presents practical methods for detecting, diagnosing and correcting fluid power problems within a system. The work details the design, maintenance, and troubleshooting of pneumatic, hydraulic and electrical systems and components. This second edition stresses: developments in understanding the complex interactions of components within a fluid power system; cartridge valve systems, proportional valve and servo-systems, and compressed air drying and filtering; noise reduction and other environmental concerns; and more.;This work should be of interest to mechanical, maintenance, manufacturing, system and machine design, hydraulic, pneumatic, industrial, chemical, electrical and electronics, lubrication, plastics processing, automotive, process control, and power system engineers; manufacturers of hydraulic and pneumatic machinery; systems maintenance personnel; and upper-level undergraduate and graduate students in these disciplines.

mechanical seal vs packing: Bioprocess Engineering Bjorn K. Lydersen, Nancy A. D'Elia, Kim L. Nelson, 1994-04-18 Divided into four sections, the first and third reflect the fact that there are two types of equipment required in the plant--one in which the actual product is synthesized or processed such as the fermentor, centrifuge and chromatographic columns; and the other that supplies support for the facility or process including air conditioning, water and waste systems. Part two describes such components as pumps, filters and valves not limited to a certain type of equipment. Lastly, it covers planning and designing the entire facility along with requirements for containment and validation of the process.

mechanical seal vs packing: Pump Characteristics and Applications Michael Volk, 2013-10-21 Providing a wealth of information on pumps and pump systems, Pump Characteristics and Applications, Third Edition details how pump equipment is selected, sized, operated, maintained, and repaired. The book identifies the key components of pumps and pump accessories, introduces the basics of pump and system hydraulics as well as more advanced hydrau

mechanical seal vs packing: Pump Characteristics and Applications, Third Edition Michael Volk, 2013-10-21 Providing a wealth of information on pumps and pump systems, Pump Characteristics and Applications, Third Edition details how pump equipment is selected, sized, operated, maintained, and repaired. The book identifies the key components of pumps and pump accessories, introduces the basics of pump and system hydraulics as well as more advanced hydraulic topics, and details various pump types, as well as special materials on seals, motors, variable frequency drives, and other pump-related subjects. It uses example problems throughout the text, reinforcing the practical application of the formulae and analytical presentations. It also includes new images highlighting the latest generation of pumps and other components, explores troubleshooting options, and incorporates relevant additions into the existing chapters. What’s New in This Edition: Includes more than 150 full-color images which significantly improve the reader’s ability to understand pump drawings and curves Introduces a new chapter on pump case studies in a format that provides case study background, analysis, solutions, and lessons learned Presents important new updates and additions to other chapters Includes a ten-step procedure for determining total pump head Discusses allowable and preferred operating ranges for centrifugal

pumps Provides charts covering maximum and normally attainable pump efficiencies, performance corrections for slurry pumps, and mechanical seal flush plans Pump Characteristics and Applications, Third Edition is appropriate for readers with all levels of technical experience, including engineering and pump industry professionals, pump operators and maintenance technicians, upper-level undergraduate and graduate students in mechanical engineering, and students in engineering technology programs.

mechanical seal vs packing: Root Cause Failure Analysis R. Keith Mobley, 1999-04-15 Presents the concepts needed to effectively perform industrial troubleshooting investigations and describes the methodology to perform Root Cause Failure Analysis. Also included are equipment design and troubleshooting guidelines to perform RCFA on machinery found in most production facilities.

mechanical seal vs packing: Water and Wastewater Conveyance Frank R. Spellman, 2016-08-05 Water and Wastewater Conveyance: Pumping, Hydraulics, Piping, and Valves provides fundamental, basic information on the conveyance of water and wastewater. Written in straight-forward and easy-to-understand language for professionals and non-professionals alike, it provides the techniques to assist water and wastewater operators to better understand basic pump operations and applications, maintenance regimens, and troubleshooting procedures. Addressing a multitude of water quality issues, it provides an introduction to water hydraulics, piping systems, tubes, hoses, and ancillaries as well as valves, and the maintenance requirements of each. It also discusses common operational problems and their appropriate corrective actions. Definitions of key terms and self-examination questions are provided at the end of each chapter.

mechanical seal vs packing: Basic Mechanical Maintenance Procedures at Water and Wastewater Plants Glenn M. Tillman, 1991-08-23 This is the first volume in a series of practical operator-oriented books written to help ensure the proper operation and maintenance of water and wastewater plants. The guides concentrate on how to perform the actual work required to keep a plant running smoothly. They are not detailed, reference-filled treatment studies. Basic Mechanical Maintenance Procedures at Water and Wastewater Plants is written in a straightforward manner using everyday language. It will show you how to keep systems running smoothly, troubleshoot and solve problems, reduce equipment failure, practice safety, and save money. Each chapter is written in an easy-to-follow, step-by-step format, with extra pages and room for notes so you can customize the book to meet your specific needs. The book includes information on the following: Equipment lockout procedures Lubrication Bearings Shafts and couplings Mechanical power transmission Centrifugal pumps Reciprocating pumps Rotary pumps Valves Pipeline maintenance Maintenance schedules This book is a must have for all water and wastewater operations and maintenance personnel.

mechanical seal vs packing: Surface Production Operations: Volume IV: Pumps and Compressors Maurice Stewart, 2018-11-27 For over thirty years, the Surface Production Operations Series has taken the guess work out of the design, selection, installation, operation, testing, and troubleshooting of surface production equipment. The fourth volume in this series, Pumps and Compressors is directed to both entry-level personnel and practicing professionals looking for an up-to-date reference book on managing, evaluating, sizing, selecting, installing, operating and maintaining pump and compressor systems. Packed with examples drawn from years of design and field experience, this reference features many charts, tables, equations, diagrams, and photographs to illustrate the basic applications including pump hydraulics, centrifugal and reciprocating compressor applications, compressor performance maps, pump performance curves, pump and compressor testing and installation, and many more critical topics. Packed with practical solutions Surface Production Operations: Pumps and Compressors delivers an essential design and specification reference for today's engineers. - Covers application and performance considerations for all types of pumps and compressors - Delivers hands-on manual for applying mechanical and physical principles to select and design pump and compressor systems, supported by many tables and diagrams - Gives expert advice on how to apply design codes and standards such as API 610, API

674, ANSI B78.1, API 617, API 11P, API RP 14C and the Hydraulic Institute

mechanical seal vs packing: Utilitiesman 3 & 2 Paul J. Moore, 1983

mechanical seal vs packing: Major Process Equipment Maintenance and Repair Heinz P. Bloch, Fred K. Geitner, 1997-01-10 This updated edition is an invaluable source of practical cost-effective maintenance, repair, installation, and field verification procedures for machinery engineers. It is filled with step-by-step instructions and quick-reference checklists that describe preventive and predictive maintenance for major process units such as vertical, horizontal, reciprocating, and liquid ring vacuum pumps, fans and blowers, compressors, turboexpanders, turbines, and more. Also included are sections on machinery protection, storage, lubrication, and periodic monitoring. A new section examines centrifugal pumps and explains how and why they continue to fail. More new information focuses on maintenance for aircraft derivative gas turbines. This revised edition gives special attention throughout to maintenance and repair procedures needed to ensure efficiency, performance, and long life.

mechanical seal vs packing: *Handbook of Water and Wastewater Treatment Plant Operations* Frank R. Spellman, 2003-06-24 Water and wastewater treatment plant operators must have a breadth of knowledge that encompasses more than scientific theory. They need to be generalists with knowledge bridging several scientific, academic, and engineering disciplines. Unfortunately, until now, many of the existing texts in the field were too limited in scope and narrow in focus.

mechanical seal vs packing: Good School Maintenance Illinois Association of School Boards, Springfield, 1996 This manual, published by the Illinois Association of School Boards, was designed to be used as a teaching tool and reference source for overseeing effective school maintenance. Section 1 describes the basics of good school maintenance, including managing the program, using computers, controlling energy costs, ensuring safe practices, designing buildings for efficient maintenance, and being informed about environmental issues. Section 2 details guidelines for operating cleaning and general building services, such as custodial operations, area cleaning programs, and equipment and supplies. A custodian's glossary is included. The third section provides guidelines for building maintenance, specifically, caring for the exterior and roof. Procedures for maintaining school grounds are detailed in the fourth section. The fifth section describes the maintenance of mechanical equipment, including heating and air conditioning systems, sanitary systems and fixtures, sewage treatment plants, and electrical systems. A management tools appendix contains a list of environmental resources; sections on cleaning and general building services, grounds maintenance, and mechanical equipment; and annual inspection checklists. (LMI)

mechanical seal vs packing: MECHANICAL MAINTENANCE BOOK PANKAJ, This PDF (Mechanical maintenance-Rotating/Static equipment’s)ready for day to day mechanical maintenance job and for interview purpose (refer many books and taken photos/drawings).

mechanical seal vs packing: Pump Characteristics and Applications, Second Edition Michael Volk, 2005-04-07 This hands-on reference offers a practical introduction to pumps and provides the tools necessary to select, size, operate, and maintain pumps properly. It highlights the interrelatedness of pump engineering from system and piping design to installation and startup. This updated second edition expands on many subjects introduced in the first edition and also provides new in-depth discussion of pump couplings, o-rings, motors, variable frequency drives, pump life-cycle cost, corrosion, and pump minimum flow. Written by an acclaimed expert in the field, Pump Characteristics and Applications, Second Edition is an invaluable day-to-day reference for mechanical, civil, chemical, industrial, design, plant, project, and systems engineers; engineering supervisors; maintenance technicians; and plant operators. It is also an excellent text for upper-level undergraduate and graduate students in departments of mechanical engineering, mechanical engineering technology, or engineering technology. About the Author Michael W. Volk, P.E., is President of Volk & Associates, Inc., Oakland, California (www.volkassociates.com), a consulting company specializing in pumps and pump systems. Volk's services include pump training seminars; pump equipment evaluation, troubleshooting, and field testing; expert witness for pump litigation;

witnessing of pump shop tests; pump market research; and acquisition and divestiture consultation and brokerage. A member of the American Society of Mechanical Engineers (ASME), and a registered professional engineer, Volk received the B.S. degree (1973) in mechanical engineering from the University of Illinois, Urbana, and the M.S. degree (1976) in mechanical engineering and the M.S. degree (1980) in management science from the University of Southern California, Los Angeles.

Related to mechanical seal vs packing

Department of Mechanical Engineering College of Engineering Our mechanical engineering students and faculty are working on research focusing on controls, robotics, and automation. This year, we launched a rocket that will collect data to aid future

Mechanical and Electrical Engineer Consultants | HVAC, MEP, Our team encompasses everything needed to see a job through from start to finish including: mechanical engineering, electrical engineering, plumbing, and fire protection. Responding

Mechanical Services | Kaizen Mechanical Services Providing mechanical services for the greater Lafayette and surrounding areas. Call today for a quote and more information

MECHANICAL Definition & Meaning - Merriam-Webster The meaning of MECHANICAL is of or relating to machinery or tools. How to use mechanical in a sentence. Synonym Discussion of Mechanical

HVAC Service & Installation | Lake Charles, Baton Rouge, LA At Calcasieu Mechanical Contractors, Inc., we understand how challenging it is to find a reputable commercial HVAC company in Lafayette. We have large-scale construction capabilities for

Mechanical engineering - Wikipedia The application of mechanical engineering can be seen in the archives of various ancient and medieval societies. The six classic simple machines were known in the ancient Near Eas

Mechanical Contractors in Lafayette, LA - The Real Yellow Pages From Business: Star Service is a progressive HVAC contractor founded in 1952. We are committed to providing excellent service, maintenance and design-build of air conditioning 2.

Mechanical Engineering 4-Year Plan Find more information and see all MCHE degree plan options

Moulis Mechanical | Home We are a locally owned and family operated business since 1984. Our top qualified staff is ready and willing to assist with any project, no matter the requirements. For over 30 years we have

Preferred Group | Mechanical, Civil & Ironworks | Central Louisiana Preferred Group specializes in mechanical, civil, and ironworks construction for your commercial, industrial, or municipal needs. Contact us for a quote

Department of Mechanical Engineering College of Engineering Our mechanical engineering students and faculty are working on research focusing on controls, robotics, and automation. This year, we launched a rocket that will collect data to aid future

Mechanical and Electrical Engineer Consultants | HVAC, MEP, Our team encompasses everything needed to see a job through from start to finish including: mechanical engineering, electrical engineering, plumbing, and fire protection. Responding

Mechanical Services | Kaizen Mechanical Services Providing mechanical services for the greater Lafayette and surrounding areas. Call today for a quote and more information

MECHANICAL Definition & Meaning - Merriam-Webster The meaning of MECHANICAL is of or relating to machinery or tools. How to use mechanical in a sentence. Synonym Discussion of Mechanical

HVAC Service & Installation | Lake Charles, Baton Rouge, LA At Calcasieu Mechanical Contractors, Inc., we understand how challenging it is to find a reputable commercial HVAC company in Lafayette. We have large-scale construction capabilities for

Mechanical engineering - Wikipedia The application of mechanical engineering can be seen in

the archives of various ancient and medieval societies. The six classic simple machines were known in the ancient Near Eas

Mechanical Contractors in Lafayette, LA - The Real Yellow Pages From Business: Star Service is a progressive HVAC contractor founded in 1952. We are committed to providing excellent service, maintenance and design-build of air conditioning 2.

Mechanical Engineering 4-Year Plan Find more information and see all MCHE degree plan options

Moulis Mechanical | Home We are a locally owned and family operated business since 1984. Our top qualified staff is ready and willing to assist with any project, no matter the requirements. For over 30 years we have

Preferred Group | Mechanical, Civil & Ironworks | Central Louisiana Preferred Group specializes in mechanical, civil, and ironworks construction for your commercial, industrial, or municipal needs. Contact us for a quote

Department of Mechanical Engineering College of Engineering Our mechanical engineering students and faculty are working on research focusing on controls, robotics, and automation. This year, we launched a rocket that will collect data to aid future

Mechanical and Electrical Engineer Consultants | HVAC, MEP, Our team encompasses everything needed to see a job through from start to finish including: mechanical engineering, electrical engineering, plumbing, and fire protection. Responding

Mechanical Services | Kaizen Mechanical Services Providing mechanical services for the greater Lafayette and surrounding areas. Call today for a quote and more information

MECHANICAL Definition & Meaning - Merriam-Webster The meaning of MECHANICAL is of or relating to machinery or tools. How to use mechanical in a sentence. Synonym Discussion of Mechanical

HVAC Service & Installation | Lake Charles, Baton Rouge, LA At Calcasieu Mechanical Contractors, Inc., we understand how challenging it is to find a reputable commercial HVAC company in Lafayette. We have large-scale construction capabilities for

Mechanical engineering - Wikipedia The application of mechanical engineering can be seen in the archives of various ancient and medieval societies. The six classic simple machines were known in the ancient Near Eas

Mechanical Contractors in Lafayette, LA - The Real Yellow Pages From Business: Star Service is a progressive HVAC contractor founded in 1952. We are committed to providing excellent service, maintenance and design-build of air conditioning 2.

Mechanical Engineering 4-Year Plan Find more information and see all MCHE degree plan options

Moulis Mechanical | Home We are a locally owned and family operated business since 1984. Our top qualified staff is ready and willing to assist with any project, no matter the requirements. For over 30 years we have

Preferred Group | Mechanical, Civil & Ironworks | Central Louisiana Preferred Group specializes in mechanical, civil, and ironworks construction for your commercial, industrial, or municipal needs. Contact us for a quote

Department of Mechanical Engineering College of Engineering Our mechanical engineering students and faculty are working on research focusing on controls, robotics, and automation. This year, we launched a rocket that will collect data to aid future

Mechanical and Electrical Engineer Consultants | HVAC, MEP, Our team encompasses everything needed to see a job through from start to finish including: mechanical engineering, electrical engineering, plumbing, and fire protection. Responding

Mechanical Services | Kaizen Mechanical Services Providing mechanical services for the greater Lafayette and surrounding areas. Call today for a quote and more information

MECHANICAL Definition & Meaning - Merriam-Webster The meaning of MECHANICAL is of or relating to machinery or tools. How to use mechanical in a sentence. Synonym Discussion of

Mechanical
HVAC Service & Installation | Lake Charles, Baton Rouge, LA At Calcasieu Mechanical Contractors, Inc., we understand how challenging it is to find a reputable commercial HVAC company in Lafayette. We have large-scale construction capabilities for
Mechanical engineering - Wikipedia The application of mechanical engineering can be seen in the archives of various ancient and medieval societies. The six classic simple machines were known in the ancient Near Eas
Mechanical Contractors in Lafayette, LA - The Real Yellow Pages From Business: Star Service is a progressive HVAC contractor founded in 1952. We are committed to providing excellent service, maintenance and design-build of air conditioning 2.
Mechanical Engineering 4-Year Plan Find more information and see all MCHE degree plan options
Moulis Mechanical | Home We are a locally owned and family operated business since 1984. Our top qualified staff is ready and willing to assist with any project, no matter the requirements. For over 30 years we have
Preferred Group | Mechanical, Civil & Ironworks | Central Louisiana Preferred Group specializes in mechanical, civil, and ironworks construction for your commercial, industrial, or municipal needs. Contact us for a quote

Related to mechanical seal vs packing

Mechanisms: Mechanical Seals (Hackaday7y) On the face of it, keeping fluids contained seems like a simple job. Your fridge alone probably has a dozen or more trivial examples of liquids being successfully kept where they belong, whether it’s
Mechanisms: Mechanical Seals (Hackaday7y) On the face of it, keeping fluids contained seems like a simple job. Your fridge alone probably has a dozen or more trivial examples of liquids being successfully kept where they belong, whether it’s
Converting a Pump to Use Mechanical Seals (POWER Magazine16y) Wear and leakage are common maintenance problems that result in pump discharge pressure dropping below optimum levels and reduced pump efficiency. Converting pumps to mechanical seals eliminates
Converting a Pump to Use Mechanical Seals (POWER Magazine16y) Wear and leakage are common maintenance problems that result in pump discharge pressure dropping below optimum levels and reduced pump efficiency. Converting pumps to mechanical seals eliminates
Innovative alternative to mechanical seals (Engineering News3y) “Conventional packing must leak to perform and common system upsets adversely affect the performance of mechanical seals. With this system, which uses braided rings in conjunction with other
Innovative alternative to mechanical seals (Engineering News3y) “Conventional packing must leak to perform and common system upsets adversely affect the performance of mechanical seals. With this system, which uses braided rings in conjunction with other

Back to Home: http://www.devensbusiness.com