The HI Basic Training platform was designed to provide the essential fundamental information on pumps, components, pump systems and other relevant topics. Watch webinars where HI subject matter experts present the fundamentals and read whitepapers to gain a more in-depth understanding.
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PUMPS
i. **Introduction to Selecting a Pump Test Acceptance Grade**
   - Understanding of hydraulic acceptance test grades for rotodynamic pumps and their effect on the equipment size, operation in the field, cost, and delivery
   - The applicable hydraulic acceptance test standards
   - The harmonized acceptance grades in each standard
   - The grades of acceptance testing for rotodynamic pumps
   - The different unilateral and bilateral tolerances that may be applied to the guaranteed point
   - The impact on cost, delivery, and power consumption due to the hydraulic acceptance graded specified
   - The impact on motor sizing that unilateral and bilateral acceptance grades can have
   - How submittal curves may reflect the acceptance grade

ii. **Introduction to Positive Displacement Pumps**
   - What a positive displacement pump is and what types of pumps are included in this classification
   - The differences in various pump designs
   - The markets where positive displacement pumps are commonly used
   - Application considerations when using positive displacement pumps

iii. **Introduction to Rotodynamic Pumps**
   - What a rotodynamic pump is, and the classifications of rotodynamic pumps
   - Introduction to rotodynamic pump markets
   - Overview of rotodynamic pump types and nomenclature
COMPONENTS
i. **Introduction to Bearing Isolators**

- Types of bearing protection devices
- Purpose of Bearing Isolators
- Types of Bearing Isolators
- Labyrinth Isolators
- Magnetic Isolators
- Certifications and Standards
- Required information to specify Bearing Isolators

ii. **Introduction to Eddy Current Drives**

- Learn the history of the technology
- Theory of operation
- Basic application considerations

Also included will be motor application recommendations for use with eddy current drives. The webinar will touch upon advantages offered by eddy current technology as well as some limitations or cautions.

iii. **Introduction to Expansion Joints**

- Understand the features and benefits of performance metal and rubber expansion joint design
- Apply both restrained and unrestrained expansion joint arrangements effectively
- Identify the sources of damaging pipe stresses/nozzle loads and the consequences of neglecting them
- Recognize system optimization with reductions in footprint and energy consumption
- Learn how to minimize loads on piping, equipment and support structure
- Understand how to reduce material and construction costs
- Understand key elements of piping codes (ex. ASME B31.1, B31.3) and standards (ex. ANSI/HI 9.6.2, 9.6.6) for seamless integration
- Identify a plant reliability and efficiency program that includes: a condition-based preventive maintenance program, an improved assessment of failure modes, and conducting plant surveys with traditional and advanced inspection methods

iv. **Introduction to Mechanical Seals**

- The basic principles of mechanical seals, design variations, and limits is a tool that allows users to ascertain if they can achieve the Mean Time Between Repairs desired
- Proper seal selection
- Gain a better understanding of how seal life is affected by proper equipment operation, equipment condition, and correct seal and material selection
- How to specify, select, and operate ancillary equipment used to control the seal’s operating environment
- Which seal plan will produce the results required by the owner
v. Introduction to Bearing Lubrication

• What are the functions of a lubricating system
• Lubrication fundamentals for rolling element bearings
• Methods of rolling element bearing lubrication
• Review of the critical role quality and quantity of lubrication play in bearing function and life cycle
• Learn best practices for improving quantity and quality of lubrication
• Understanding of IP Codes (Ingress Protection)
• Overview of bearing isolator selection considerations

vi. Introduction to Induction Motors

• Core principles and concepts relating to induction motors
• Basic knowledge on how AC Electric motors work
• How to select and size the right motor for any pumping application
• Guidance on the electrical requirements and general functions of electric motors

vii. Introduction to Rolling Element Bearings

• The different types of rolling element bearings
• How rolling element bearings carry load
• Load and speed characteristics by type
• Bearings general features and applications
• General lubrication requirements
• Bearing fits and mounting considerations

viii. Introduction to Couplings in Pumping Applications

• Primary functions of the coupling
• Types of pump couplings and their application considerations
• Pump coupling selection considerations
• Considerations to extend coupling life
SYSTEMS
i. **Introduction to System Hydraulics**
   - Developing the system curve
   - Understanding the pump curve
   - Pump/system interaction and the operating point
   - Varying the operating point
   - Introduction to Parallel and Series pumping

ii. **Introduction to Flow Modeling**
   - The benefits of using hydraulic modeling software
     - Basic inputs required/conditions
   - What hydraulic modeling can and can't tell you
   - What are models solving? How does that relate to the software as a tool?
   - What is analysis software and why use it? What are you solving?
   - What kinds of things can you do with flow analysis, what can it help

iii. **Introduction to Pulsation Dampening**
   - Pumps and Pulsation
   - Which types of pumps create pressure/flow pulsation and why
   - Issues/problems created by pulsation
   - Explanation of magnitude and frequency of pulsation for various pump types
   - Pulsation Dampeners
   - General principal of operation of a pulsation dampener
   - Types of Dampeners and their Pros/Cons
   - Configurations and their Pros/Cons
   - Charge valve options
   - Primary and secondary criteria for Dampener Specification
   - Effect of Pulsation and Vibration on Piping Systems
   - How analysis is accomplished
   - Typical solutions for vibration problems

iv. **Introduction to Water Hammer**
   - Water Hammer Overview
     - Accidents
     - Physics - Four Stages of Water Hammer
     - Joukowsky Equation
     - Communication Time
     - Different Types of Waterhammer
     - Brief Discussion of Fundamental Equations
   - Pulsation Dampeners
     - General principal of operation of a pulsation dampener
     - Types of Dampeners and their Pros/Cons
     - Configurations and their Pros/Cons
   - Types of Piping and Wave Speed
   - Changing Component Behavior
   - Surge Relief Valves
- Vacuum Breaker Valves
- Surge Vessels
GENERAL
i. **Introduction to HI Standards**

Peter Gaydon, Hydraulic Institute's Technical Director, provides an overview of HI’s Standards and Guidebook portfolio. An introduction into how HI creates standards and guidelines, an overview of the numbering scheme used, and an introduction into the numerous standards and guidelines that are published by HI.

ii. **Introduction to PSAP Certification**

- The importance of pump system assessments
- Eligibility requirements for the PSAP certification
- The application process
- How the certification exam was created
- How to schedule a certification exam
- Resources to help you study for the certification exam

iii. **Introduction to the U.S. DOE Pump Rulemaking**

- The five options to calculate the performance metrics outlined in the DOE Energy Conservation Standard and Test Procedure for C&I Clean Water Pumps
- How to calculate constant load or variable load Pump Energy Index (PEI), for various clean water pump configurations

iv. **Introduction to the HI Energy Rating Program**

An overview of the HI Energy Rating Program and how pump manufacturers and utilities can participate to provide incentive programs to end-users. Attendees will learn about the collaborative work between the DOE, HI, and other industry stakeholders to promote energy efficient pumps and how the HI Energy Rating is currently being utilized for energy efficient incentive programs.
WHITE PAPER
i. **Proper Lubrication Methods for Bearings**

This white paper is a guideline for the design and application of bearing housing systems for horizontal process pumps.

ii. **Understanding the Effects of Selecting a Pump Performance Test Acceptance Grade**

This paper highlights the importance of selecting the appropriate acceptance grade for pump performance testing to satisfy the needs of its intended service.

iii. **New Combined Rotodynamic Pump Single Series Standards**

HI completed a multi-year effort to combine the “1-series” standards covering centrifugal pumps and the “2-series” standards covering vertical pumps into a new, single “14 series” standard. This new American National (ANSI) Standard covers both pump types in a single standard series for rotodynamic pumps spanning:

- Nomenclature and Definitions ANSI/HI 14.1-14.2
- Design and Application ANSI/HI 14.3
- Performance Acceptance Tests ANSI/HI 14.6