Pumps - Tutorial

A self-paced MultiMedia based Tutorial/CBT on Pumps

Tutorial/CBT:

This interactive tutorial provides an Overview, Operating Principles, Lubrication and Mechanical Seal details for Centrifugal and Positive Displacement Pumps using Voice, Video, Animation and Graphics.

Overview
- Introduction
- Pump Types
- Seals and Lubrication

Centrifugal Pumps
- Introduction
- Pump Components
- Impellers
- Piping System
- Drivers and Couplings
- Variations of Centrifugal Pumps
- Centrifugal Pump Performance

Operation of Centrifugal Pumps
- Introduction
- Cavitation
- Internal Recirculation
- Minimum Flow Control System
- Priming
- Starting and Stopping Procedures
- Spare Pump Operation
- Routine Maintenance
- Troubleshooting

Operation of Positive Displacement Pumps
- Overview
- Pump Operation
- Routine Maintenance
- Troubleshooting

Positive Displacement Pumps
- Overview
- Reciprocating Piston Pump
- Reciprocating Plunger Pump
- Reciprocating Diaphragm Pump
- Gear Pump
- Lobe Pump
- Vane Pump
- Positive Displacement Pump Piping System
- Applications of Positive Displacement Pumps

Pump Lubrication
- Introduction
- Lubrication Fundamentals
- Methods of Lubrication
- Quantity of Lubrication
- Quality of Lubrication
- Lubrication Management
- General Recommendations

Pump Mechanical Seals
- Introduction
- Seal Leakage
- Dynamic Secondary Seals
- Static Secondary Seals
- Materials of Secondary Seals
- Seal Covers
- Construction of Mechanical Seals
- Mechanical Seal Piping Plans

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3. Operation of Centrifugal Pump - Priming

The process of filling the pump and its associated suction and discharge piping is called "priming" the pump.

General Methods of Priming

Method 1:

Liquid is admitted to the suction pipe until the air is displaced from the suction pipe, the pump casing, and the discharge line to the block valve and they are completely filled with liquid.

Air is Displaced

Completely Filled with Liquid

5. Operation of Positive Displacement Pump - Pump Operation

Pre-Operational Checks

- Read the instruction manual
- Ensure that the pump and piping are clean
- Install the suction strainer
- Clean and flush all bearing housings
- Ensure all bearings are charged with the correct lubricant
- Check pump connections
- Ensure all suction and discharge valves are in open position
- Ensure the unit is in "nominal" condition
- Ensure relief valve system is in service
- Check that seals are correctly assembled and tightened
- With the coupling disconnected, test spin the motor to ensure the correct direction of motor rotation
- Install the coupling
- Ensure that the pump and motor are correctly aligned with the coupling installed
- Install the coupling guard, if required
- Torque all bolts and plugs to ensure tightness

6. Pump Mechanical Seals: Dynamic Secondary Seal

The most commonly applied designs are:
- O-Ring
- Wedge Ring
- U-Cup Ring

O-Rings are mounted in a slot with a rectangular cross-section within the rotating ring. The slot is a little less deep than the thickness of the O-Ring and a little wider than the thickness of the O-Ring.

Sealing is achieved when the O-Ring is compressed. The rotating ring can move because of the flexibility of the O-Ring.

- Tutorial has a built-in Quiz and comes with a Learning Management System (LMS) called TutAdmin. The LMS allows an instructor to register trainees and monitor their performance and Quiz scores
- Tutorial is available as a Standalone or Web based application
- Available in English, Chinese, Danish, Dutch, French, German, Spanish and Swedish