Pump Basics Course I

Purpose

To acquire basic knowledge regarding pumps, including the structure and principles of pumps, performance management, and operation management.

Characteristics

★ Using cut section models of various pumps and a variety of videos of experiments related to operating theory, we’re going to learn the basics of pump mechanisms, theory, performance, and operation.
★ Combining animated computer graphics, narration, and real video imagery, the explanations are given a sense of presence and realism.
★ With interactive content interspersed in various places, students can progress through the materials at their own pace.

Curriculum

Before You Start Studying
Chapter 1 Structure of Pumps
Chapter 2 Essential Capabilities of Pumps
Chapter 3 Principles of the Pump
Chapter 4 Pump Performance Curves
Chapter 5 Performance and Operating Conditions
Chapter 6 Cavitation

Who should take this course

Novice and mid-level employees responsible for maintenance work; operators and engineers on production-sites (plants); and workers, supervisors and administrators in the field

Course material outline

◆ Expected learning time: 8 hours  ◆ Number of tests: 2
◆ Shortest duration: 214 minutes

Supervised by

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Chapter 1  
Structure of Pumps  
101 Purposes and Roles of Pumps  
102 Types of Pumps  
103 Flow of Liquids  
104 Structure of Pumps  

Chapter 2  
Essential Capabilities of Pumps  
201 Energy and Head of Liquids  
202 Bernoulli’s Principle  
203 Actual Head  
204 Total Head  
205 Steps to Calculate the Total Head  
206 Calculating the Total Head (1)  
Straight Pipe Section Friction Head Loss  
207 Calculating the Total Head (2)  
Valve/Joint Head Loss  
208 Calculating the Total Head (3)  
Pipe Resistance Curves  

Chapter 3  
Principles of the Pump  
301 Pump Theory  
302 Flow of Liquid in the Impeller  
303 Energy Imparted by the Impeller  
304 Euler’s Equations  
305 Theoretical Head and the Impeller (1)  
306 Theoretical Head and the Impeller (2)  

Chapter 4  
Pump Performance Curves  
401 Theoretical Head  
402 Pump Head and Loss  
403 Pump Characteristics and Surging  
404 Operating Point and Flow Regulation  
405 Shaft Horse Power  
406 Pump Efficiency  
407 Performance Curves  

Chapter 5  
Performance and Operating Conditions  
501 Characteristics of Liquids and Performance of Pumps  
502 Rotational Speed and Pump Performance  
503 Impeller Cutting and Pump Performance  
504 Calculating Energy Savings Due to Impeller Cutting  
505 Performance during Parallel Operation  

Chapter 6 Cavitation  
601 How Cavitation Occurs  
602 Problems Caused by Cavitation  
603 Cavitation and NPSH  
604 Calculating NPSH  
605 Changes in Discharge Flowrate and NPSH  
606 Cavitation Countermeasures