



Centrifugal Pump operation, maintenance & troubleshooting

Duration 5 Days

Introduction

This course provides delegates with a good understanding and practical knowledge of the operation and maintenance practices applicable to general pumps and pumping systems

Who Should Attend

All persons of who will have a requirement to carry out, or to be concerned with, operation and maintenance of pumps and pumping systems

Course Objectives

The course will ensure that all delegates are able to:

- Knowledgeably describe the types of pumps and their applications
- Demonstrate a good understanding of the operational requirements for pumps and pumping systems
- Knowledgeably describe the maintenance techniques to be used in the fault diagnosis, defect repair and general maintenance of pumps
- Understand the safety requirements and practices applicable to working with pumping equipment

Course Outlines:

1. *Introduction:*
 - Pump Functions
 - Pump Classifications
 - Centrifugal Pump Operating Principles
2. *Centrifugal Pump Components Review*
 - Casing - Shaft
 - Shaft Sleeve - Impeller
 - Impeller Vanes - Impeller Wear Ring
 - Suction Port - Discharge Port
 - Bearings - Volute
3. *Packing Gland Assemblies*
 - Solid Packed Glands
 - Internally Sealed Glands
 - Packing Failure
 - Cause & Corrective procedures
4. *Impeller Design and Types of Suction*
 - Open Impellers - Partially Enclosed Impellers
 - Single Suction - Double Suction
 - Axial Thrust - Impeller Balance
 - Impeller Sizing
5. *Multistage Centrifugal Pumps*
 - Axial Split Casings - Radially Split Casings
 - Axial Thrust - Hydraulic Balancing
6. *Mechanical Seals*
 - Materials of construction
 - Classification of seals



- Mechanical seal selection
- Selection of the primary seal
- Selection of the seal arrangement
- Date requirement for seal selection
- Practical considerations in using mechanical seals
- Installation & operation
- Testing & verification of mechanical seals for critical duties
- Case studies
- 7. *Pump Bearings*
 - Bearing Functions
 - Critical Speed
 - Plain Bearings
 - Antifrictional Bearings
 - Bearing Selection
 - Forces Acting on a Shaft
 - Bearing Classifications
 - Plain Bearing Materials
 - Antifrictional Bearing Materials
 - Bearing Extraction and Fitting
- 8. *Monitoring of bearing temperatures*
 - Bearing Temperature Rise
 - Automatic trip
 - Bearing Failure Trending
- 9. *Vibration Measurement Monitoring and Analysis*
 - Definitions, Descriptions, Types
 - Principles of Vibration Measurement
 - Evaluation of Vibration Measurement
 - Vibration transducers
 - Relative Displacement Transducers
 - Absolute Vibration Transducers
- 10. *Lubrication*
 - Lube Oil Analysis & Selection
 - Monitoring and analysis of lube oil debris
 - Oil deterioration
- 11. *Mechanical Seals Failure Analysis*
 - Failure definitions, diagnostic approach & recording
 - External symptoms of seal failure
 - Checks before dismantling
 - Visual seal examination
 - Other seal examination techniques
 - Case studies on damaged mechanical seals
- 12. *Shaft Alignment:*
 - Definitions – why bother with precise alignment?
 - Causes of misalignment – misalignment types – measuring misalignment – alignment procedures – pre-alignment steps- alignment tolerance chart – case studies / practical exercise.
- 13. *Centrifugal Pump Clinic:*
 - Pump removal
 - Disassembly
 - Repairs
 - Removing shaft bushings
 - Removing impeller wear rings
 - Removing shaft bushings
 - Removing impeller wear rings
 - Installing new bushing & wear rings
 - handling / transportation
 - What to look for



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- Machining & balancing
- Assembly
 - Cleaning & drying of parts
 - New O-rings 8 gaskets
 - Bearings
- Setting the impeller
- Installing multi-stage impellers
- Alignment
- Protection before installation