

T-006 CENTRIFUGAL PUMPS DESIGN, OPERATION, AND MAINTENANCE

An in-depth course dedicated to centrifugal pumps that illustrates all aspects of these machines, from design fundamentals, to installation and commissioning, condition monitoring, operation and troubleshooting.

This advanced course on pumps provide participants with in-depth knowledge about pump, design, operation, maintenance, commissioning, and trouble-shooting.

Taking a very practical approach, this course shows participants how design characteristics of a pump reflect in its suitability for specific applications, how to correctly operate a pump, how correct operation reflects on pump reliability, safety, and life-cycle costs. The course walks the participants through correct start-up and shut-down procedures, highlighting risks and hazards, it provides the tools to create and use an effective condition monitoring system and shows the most common failure modes of a pump, how to trouble-shoot them, and how to prevent them.

Comprehensive lecture notes are provided with the course.

Who should Attend?

The course is suitable for the following:

- Plant maintenance engineers
- Reliability engineers and operators
- Project and design engineers

Duration

5 days

Course structure and content

A 5-day technical course aimed at responsible managers and engineers:

Chapter 1 : Pump Design Fundamentals

Pump Categories
Centrifugal Pumps
Hydraulic Design Principles
Mechanical Design Principles
Design Codes (Api 610, Hydraulic Institute Standards & Iso 9906

Principal Features Of The Various Pump Design Types

Application Vs. Pump Type

Chapter 2 : Pump Components & Auxiliary Systems

Pump Hydraulic Components (Impellers, Diffusers, And Volute Casings

Pump Mechanical Components:

Mechanical Seals

Bearings

Couplings And Drivers

Mechanical Seal Systems (Api 682 Sealing Plans)

Lubrication Systems

Drivers (Electric Motors, Variable Speed Drives, Gearboxes, Turbines & Engines)

Control & Instrumentation

Chapter 3 : Pump Installation & Commissioning

Pump Installation From New & Post Repair

Pump Commissioning

Pre-Checks On Start-Up

Start-Up

Pre-Check On Shut Down

Shut-Down

Commissioning Tests And Checks

Chapter 4 : Operation For Reliability

Pump System Vs. Ump Design Duty

Indicators Of Running Pump Off Design Point

Consequences Of Running Pump Off Design Point

Operating Principles For Reducing Life-Cycle Costs

Energy Consumption Advantages Of Good Operation Practice

Reliability Advantages Of Good Operation Practice

Safety Advantages Of Good Operation Practice

Chapter 5 : Maintenance & Condition Monitoring

Categories Of Maintenance Management Regimes

Best Practice Maintenance Regime Explained

Condition Monitoring Practices

Types Of Condition Monitoring Available

Best Practice Procedures For Pump Overhaul, Repair & Refurbishment

Chapter 6: Trouble Shooting & Root-Cause Analysis

Trouble Shooting Pump Performance Problems

Trouble Shooting Pump Reliability Problems

Root-Cause Analysis Explained And Its Benefits

Identification And Elimination Of Common Pump Problems

Summary Of Pump Solutions Available

Training Outcome:

On completion of the course, you should be able to:

- Understand the key parameter in pump design, selection, operation, and maintenance
- Correctly select a centrifugal pump
- Correctly start up and shut down a pump
- Understand the main steps in pump commissioning

- Trouble-shoot pump problems in real plant environments.

Course Presenter

Calum Scott (C. Eng. M.I. Mech E): Calum has 40 years of experience in pump design, manufacturing, and service. He has over 12 years of specific experience in training end-users and major and EPC's (Engineering, Procurement and Construction) in the Oil & Gas. Petrochemical, Power, Desalination and Utility industries.