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)

**Chapter 2 : Pump Components & Auxiliary Systems**
- Principal Features Of The Various Pump Design Types
- Application Vs. Pump Type
- 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

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.