

Training Title

**PUMP TECHNOLOGY**

Duration: 5 Days

Training Dates & Venue

REF					
ME036	Pump Technology	5	12 - 16 January, 2020	\$4,500	Dubai, UAE

Training will be in any of 5 star hotels. Exact venue will be informed upon finalizing.

Training Fees

4,500 US\$ per participant for Public Training includes Materials/Handouts, Tea / coffee breaks, refreshments & Buffet Lunch

Training Certificate

Define Management Consultancy & Training Certificate of course completion will be issued to all attendees.

TRAINING OVERVIEW

TRAINING DESCRIPTION

Pumps are the lifeblood of fluid systems - they must control flow of water, fuel, oil, slurries, wastes, and chemicals very reliably. Proper design, selection, testing and commissioning require a thorough understanding of valves and pumps technology. The reliability of Lubrication system play a great part to in all types of rotating equipment specially the pumps, the appropriated lubricant and adequate lubrication system can expand the life of bearings and inherent the pump itself too

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This training course provides the skills and knowledge of the design, selection, testing , classification, and specifications of pumps , auxiliaries system. Topics include types of pumps, materials, pumps and construction and operation, losses in valves and pipes, cavitation and water hammer, bearing, lubrication, seals and packing, troubleshooting and inspection, and standard symbols. Emphasis shall be laid on topics relevant to advanced aspects and practical knowledge of testing, operation, characteristic curves and selecting the appropriate pumps and how different parameters can affect pumps and valves operating conditions. Characteristics and operating charts and curves will be stressed.

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## TRAINING OBJECTIVES

- The course is designed to understand the principles of design, specification, and classification of Pumps.
- Review the different types of pumps
- Describe the appropriate operation by learning the pump systems.
- Highlight the requirements for proper pump installation.
- Guide the participants to the right steps of pump selection
- Discuss the effect of vibration on pump performance.
- Be familiar with the right procedure for pinpointing & eliminating pump problems.
- Have an overview and checklist of pump problems

## WHO SHOULD ATTEND?

The course is targeted to technicians, supervisors, team leaders and engineers and production working in, selection, testing and commissioning of pumps, lubrication system valves and. The course is ideally suited to those personnel who are responsible for the operation, maintenance troubleshooting and repair of hydraulic valves and pumps.

## TRAINING METHODOLOGY

A highly interactive combination of lectures and discussion sessions will be managed to maximize the amount and quality of information and knowledge transfer. The sessions will start by raising the most relevant questions, and motivate everybody find the right answers. You will also be encouraged to raise your own questions and to share in the development of the right answers using your own analysis and experiences. Tests of multiple-choice type will be made available on daily basis to examine the effectiveness of delivering the course.

All presentations are made in excellent colorful power point. Very useful Course Materials will be given.

- 30% Lectures
- 30% Workshops and work presentation
- 20% Group/individual Work or projects & Practical Exercises
- 20% Videos & General Discussions, Case studies etc...

Material Language: English

Presentation Language: English

## COURSE OUTLINE

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## DAY 1

### Part

#### Introduction-

- Pump types
- Pump selection & Standards API and ISO

#### *Rotary Pumps*

- Rotary VS Centrifugal Pump
- Types of Rotary Pumps
- Operation of Rotary Pumps
- Control of Rotary Pump
- Troubleshooting

#### *Reciprocating Pumps*

- Types of Reciprocating Pumps
- Rotary VS Reciprocating Pumps
- Operation of Reciprocating Pumps
- Flow Control of Reciprocating Pumps
- Pulsation

## PART 2

Centrifugal Pump introductions  
Basic Function of Pumps  
Centrifugal Pump Basic Theory  
Centrifugal Pump Operation  
Classification of Pumps  
Pump application

## DAY 2

### Part 3

#### Centrifugal pump components

##### Components

Casing  
Volute  
Inlet flange and inlet  
Packing  
Mechanical seals  
Pump Bearings  
Shaft  
Impellers  
Effect of Entrained Solids

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P.O BOX 45304  
ABU DHABI, U.A.E

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F +971 2 6275344

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Diffuser blades

Pump cut-water

Wear rings

*Pump Components Material*

**Pump Installation Arrangements**

**Pump Intake Structures**

**Priming Devices**

**Arrangement of Measurement Points**

**Shaft Couplings**

**Pump Nozzle Loading**

#### **Part 4**

##### **Auxiliary Components**

###### **Bearing**

- Types
- Principles of bearing selection and application
- Bearing terminology
- Bearing Problems

###### **Shaft Sealing**

- Packed Stuffing Box
- Mechanical Seal types
- Seal Selection
- API682 Seal Arrangements
- Mechanical Seal Troubleshooting

###### **Coupling and alignment**

- Types coupling
- Methods of alignment

#### **DAY 3**

##### **Part 5**

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##### **PRINCIPLE OPERATION**

**Introduction to Pump Analysis**

**Pumping Concepts**

**Pump performance**

**Pump hydraulics and flow**

**Capacity**

**Head**

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**Static Suction Head (SSH)**

**Static Discharge Head (SDH)**

**Total Static Head (TSH)**

**Friction head**

**Velocity head**

**velocity triangle**

**Minor head loss**

**Pump Efficiency and Power Input**

**Pump Head-Capacity Curve**

**Pump Operating starting and shutdown**

**Characteristic Relationships For Centrifugal Pumps**

**Part 6**

**Pumps Cavitation &NPSH**

**Vapor Pressure**

**Pump Head Needed**

**NPSH**

**Available head**

**Example**

**Cavitation**

**Reasons and disadvantages**

**The cavities form for five basic reasons**

**I. Vapourization**

**II. Air ingestion**

**III. Internal recirculation**

**IV. Flow turbulence**

**V. The Vane Passing Syndrome**

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**DAY 4**

**Part 7**

**Pump losses**

**1. Loss types**

**2. Mechanical losses**

**3. Hydraulic losses**

**4. Loss distribution as function of specific speed**

**5. liquid flow in pipes& piping and friction losses**

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**Part 8**

**Pump reliability and failure**

**Components of an RCM program**

**Introduction to reliability-centered maintenance**

**RCM and failure analysis**

Failure modes

Failure descriptors

Failure descriptors

Failure causes

Method of detection

Maintenance activity

**Functions**

**Failure- Failure mode Failure effects - Failure consequences**

**Maintenance action**

**RCM information worksheet**

Failure examples

Pump

Seal bearings

**Root cause failure**

**Balance- Coupling Failure- Alignment**

**Seals types**

**Seals components**

**Bearing failure**

**Coupling and alignment**

**Shaft sag**

**DAY 5**

**Part 9**

**MAINTENANCE STRATEGY**

- **Methods of operation and control**
- **Pump circuit**
- **Type of maintenance**
- **Preventive maintenance**
- **Condition monitoring**

**Part 10**

**VIBRATION PROTECTION**

- **Vibration Analysis & Predictive Maintenance**

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- Vibration causes, forcing frequency causes, unbalance, misalignment, mechanical looseness, bearing defects, gear defects, oil whirl, blade or vane problems, electric motor defects, uneven loading, drive-shaft torsion

## TRAINING OUTCOME

By the end of this seminar delegates will be able to:

- Understanding of the different types of pumps.
- Operate pumps as close as possible to the design efficiency.
- Monitor pump efficiency, availability and reliability.
- Selection, operation and maintenance strategies.
- Troubleshoot pump problems.
- Have an ability to select the right valve for the particular application
- Tribology and lubrication system
- How the Bearing will be effected by lubrication system
- troubleshooting of systems involving pumps and lubrication problems
- Decide on the right maintenance plan concerning different types of pumps

### NOTE:

Pre & Post Tests will be conducted

Case Studies, Individual & Group Exercises, Project works (making in to groups), Role plays, Group Discussions, Last Day Review & Assessments will be carried out.

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