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# MU204:
# Pumps Design, Selection, Operation, Maintenance & Troubleshooting

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## Training Description:

The training course is designed to provide an in-depth perspective of centrifugal pump technology in terms of selection, operation, performance, control, maintenance and repair. Topics covered include pump types and terminology, packing, mechanical seals and sealing systems, bearings, couplings and other vital components. In addition, various pump types will be examined as to how they perform in their respective operating systems and advantages/disadvantages of various pump types will be discussed. Centrifugal pump operation, troubleshooting and maintenance will be dealt with in depth.

This intensive training course will provide participants with a complete and up-to-date knowledge of pumps and their systems. Further, participants will learn more about selection, operation and maintenance strategies which will assist in increasing pump availability and reliability. Upon the completion of this training course, participants will be able to troubleshoot all types of pump problems.

## Training Objectives:

By the end of the training, participants will be able to:

- ✓ Appraise current leadership competence and determine strategic plans for development of self and organisation
- ✓ Apply Relationship Awareness Theory to lead, empower and engage
- ✓ Become the authentic visionary leader who can inspire and innovate
- ✓ Lead effective change that creates value and transform the organisation
- ✓ Become the role model for emotional intelligent leadership through a spirit of engagement and trusted influence leadership
- ✓ Develop strategies for creating a positive work environment that fosters leadership

## Training Designed for:

This course is intended for those who are involved in the selection, installation, operation, performance, control, maintenance and troubleshooting of pumps. This includes plant and maintenance engineers, process engineers, maintenance technical staff, production & operation staff and reliability specialists working in a wide variety of process plant environments such as petrochemical, plastics, fertilizers, power utilities, oil, gas and water utilities.

## Training Requirement:

"Hand's on practical sessions, equipment and software will be applied during the course if required and as per the client's request."

Contents can be adapted to your specific wishes. It is therefore possible to focus on specific modules of the training course as per client's learning needs and objectives. Further, it should be forwarded to us a month prior to the course dates.

## Training Program:

*DAY ONE:*

- ❖ Pump Types and Terminology
  - Pumps
  - Pump Terminology

- Nomenclature and Definitions
- Pump Types

❖ Centrifugal Pumps
- Centrifugal Pump Theory
- Operating Characteristics
- Centrifugal Pump Operation
- Cavitations and NPSH
- Elements of Minimum Continuous Safe Flow
- (MCSF)
- How to Calculate MCSF
- Types of Centrifugal Pumps

❖ Centrifugal Pump Specification and Selection
- Selecting a Pump Vendor
- Industry Standards
- API vs. ANSI Standards
- Driver Size Selection
- Variable Speed Drive Selection
- Pump Design Audit/Review

❖ Recap

*DAY TWO:*

❖ Centrifugal Pump Maintenance and Repair
- Parts of Centrifugal Pumps
- Bearing Basics
- Balancing Criteria
- Installation and Startup
- Troubleshooting Centrifugal Pumps
- Inspecting Centrifugal Pump Components for Wear
- Centrifugal Pump Overhaul
- Case Studies

❖ Positive Displacement Pumps
- Reciprocating Pumps
- NPSH Requirement for Reciprocating Pumps
- Rotary Pump Theory and Operation
- PD Pumps in the Operating System
- How to Select Progressing Cavity Pumps

❖ Special Purpose PD Pumps
- Fluid Metering System Design and Options
- PD Metering Pumps, Plunger Pumps, Diaphragm Pumps, Rotary Metering Pumps
- Controlling Pulsation and Surge

❖ Recap

*DAY THREE:*

❖ Selection of PD Pumps
- Selecting Reciprocating (Power) Pumps

- Selecting Rotary Gear Pumps
- Selecting Screw Pumps
- Handling Abrasives and Corrosives with PD Pumps

❖ Positive Displacement Pump Operation, Maintenance and Repair
- Operation
- Reciprocating (Power) Pump Liquid End Maintenance
- Reciprocating Pump Valve Repair
- Power End Maintenance
- Stuffing Box Design and Upgrading
- Case Studies

❖ Packing and Mechanical Seals
- Compression Packing
- Molded (Automatic) Packing
- Basic Principles of Mechanical Seals
- Face Materials
- Secondary Seal Materials
- Single Mechanical Seals
- Single Mechanical Seal Flushing Plans

❖ Recap

*DAY FOUR:*

❖ Packing and Mechanical Seals
- Compression Packing
- Molded (Automatic) Packing
- Basic Principles of Mechanical Seals
- Face Materials
- Secondary Seal Materials
- Single Mechanical Seals
- Single Mechanical Seal Flushing Plans

❖ Mechanical Seal Failure Analysis and Troubleshooting
- Failure Analysis
- Mechanical Seal Troubleshooting
- Determining Leakage Rates
- Ascertaining Seal Stability
- Troubleshooting Hydraulic Instability

❖ Mechanical Seal Maintenance and Repair
- Bellows Seal Repair
- Cartridge Seal Installation and Management
- Seal Face Care
- Seal Consolidation and Standardization Programs

❖ Bearing Care and Maintenance
- Basic Concepts of Bearings
- Bearing Classifications
- Bearing Care and Maintenance
- Lubrication Management

- Recap

*DAY FIVE:*

- Couplings and Alignment
  - Purpose of Couplings
  - Types of Couplings
  - Alignment Methods
  - Foundation and Grouting Guidelines
  - Inlet Piping Configuration and Piping Installation Guidelines
- Pump Maintenance and Reliability
  - A Systems Approach to Pump Reliability
  - Predictive/Preventive
  - Addressing Pump Vibrations - Mechanical & Hydraulic
  - Fifty Upgrading Opportunities for Centrifugal Pumps
- Reliability Programs
  - Building Availability Data
  - Availability and Reliability Goals
  - How to Analyze Pump Costs
  - How to Initiate a Pump Reliability Improvement Program
- Course Conclusion
- POST-ASSESSMENT and EVALUATION

## Training Methodology:

This interactive training course includes the following training methodologies as a percentage of the total tuition hours:

- 30% Lectures, Concepts, Role Play
- 70% Workshops & Work Presentations, Techniques, Based on Case Studies & Practical Exercises, Gamification, Software & General Discussions
- Pre and Post Test

## Training Certificate(s):

CMCT Internationally recognized certificate(s) will be issued to each participant who completed the course.

## Training Fees:

TBA as per the course location - This rate includes participant's manual, hand-outs, buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

Note: The 5% VAT (Value Added Tax), will be effective starting 01st of January 2018 as per the new regulation from the UAE Government. The VAT applies for all quotation both for local and abroad.

## Training Timings:

Daily Timings:

| | |
|---|---|
| 07:45 - 08:00 | Morning Coffee / Tea |
| 08:00 - 10:00 | First Session |
| 10:00 - 10:20 | Recess (Coffee/Tea/Snacks) |
| 10:20 - 12:20 | Second Session |
| 12:20 - 13:00 | Recess (Prayer Break & Lunch) |
| 13:00 - 14:00 | Last Session |

For training registrations or in-house enquiries, please contact:

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