



## Bearing & Lubrication

### Duration 5 Days

### Introduction

The most common machine element found between what moves and what doesn't is an anti-friction bearing. This course introduces a maintenance employee to the basic types of bearings and common nomenclature used. Bearing installation and maintenance is discussed with a focus on preventing premature failure. The student is also trained to analyze failed bearings so a similar occurrence will not happen again.

### Who Should Attend:

Those involved with lubrication, oilers and maintenance personnel, engineers and technicians engaged in equipment design, tribologist and lubrication engineers, operations, material selection, purchasing and research and development.

### Course Objectives

At the end of the program participants will be able to:

- ✦ Evaluate and select appropriate lubricants for a wide variety of rolling element bearing applications.
- ✦ Choose an appropriate grease base, stiffness, base oil and additives, if needed, for proper operation.
- ✦ Choose the correct oil viscosity, delivery method (standing oil, circulating oil, air/oil, oil mist) and oil change out intervals.
- ✦ Evaluate filter effectiveness, and to select and apply appropriate filter(s).
- ✦ Troubleshoot common lubrication problems and recommend corrective actions.

### Course Outlines:

#### 1. Bearing Components

- 1.1. Plain Bearings
- 1.2. Ball or Roller Bearings
- 1.3. Cage Assembly
- 1.4. Seals, Shields, Snap-rings, and Bearing Hardware

#### 2. Bearing Types and Applications

- 2.1. Types of Radial Ball Bearings and Their Uses
- 2.2. Types of Radial Roller Bearings and Their Uses
- 2.3. Pre-mounted Bearings (Flange, Pillow Block, etc.)
- 2.4. Understanding Manufacturers Identification Numbers
- 2.5. ABMA Identification
- 2.6. Identifying Bearing Hardware
- 2.7. Internal Clearance and Bearing Application
- 2.8. ABEC and RBEC Tolerances

#### 3. Bearing Installation

- 3.1. The Importance of Cleanliness
- 3.2. Mounting Tapered Shaft Bearings
- 3.3. Proper Bearing Fits and Methods to Correct Loose Fits
- 3.4. Proper Bearing Installation Using Heat, Force, and other Methods

#### 4. Tribology

- 4.1. The cause of friction, heat, the result of friction, what causes wear
- 4.2. The types of lubrication:
  - 4.2.1. fluid and hydro-dynamic lubrication
  - 4.2.2. boundary lubrication
- 4.3. The characteristics of the lubricant under different operating conditions e.g. material surfaces, temperature conditions, load and viscosity of the lubricant

#### 5. Different types of lubricants for different applications



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## 6. The Properties Of Lubricants

- 6.1. Viscosity
- 6.2. Flashpoint and Volatility
- 6.3. Oxidation and thermal stability
- 6.4. Demulsibility
- 6.5. Foaming and gas solubility
- 6.6. Corrosion prevention
- 6.7. Compatibility

## 7. Lubricating Oil Additives

- 7.1. Oxidation inhibitors
- 7.2. Rust and corrosion inhibitor
- 7.3. Pour point depressants
- 7.4. Viscosity inhibitor (VI) improvers
- 7.5. Anti-wear additives
- 7.6. Extreme pressure (EP) additives
- 7.7. Anti-foam additives
- 7.8. Detergents and dispersants additives
- 7.9. Demulsifiers and Emulsifiers
- 7.10. Tackiness additives

## 8. Types Of Lubricants

### 9. Greases And Grease Lubrication

- 9.1. Grease characteristics
- 9.2. Lubrication grease classification
- 9.3. Choice of grease
- 9.4. Grease types and performance
- 9.5. Grease application and trouble-shooting
- 9.6. Roller bearing lubrication

### 10. Hydraulic Systems And Fluids

- 10.1. Hydraulic systems
- 10.2. Viscosity of the lubricant
- 10.3. Chemical stability
- 10.4. Fire resistance
- 10.5. Anti-wear
- 10.6. Anti-rust
- 10.7. Anti-foam

### 11. Miscellaneous Lubrication

- 11.1. Steam Turbine Pumps and Motor Lubrication
- 11.2. Air Compressor Lubrication

### 12. Lubrication Systems Filtration

- 12.1. Contamination fundamentals
- 12.2. Contamination generation
- 12.3. Cleanliness control
- 12.4. Filter fundamentals
- 12.5. Filter performance and testing
- 12.6. Flashing

### 13. Conditions Assessment Of Rotating Machinery

- 13.1. Monitoring techniques
- 13.2. Vibration analysis
- 13.3. Oil analysis

### 14. Tribology Root Causes Of Failures

- 14.1. Fluid contamination control



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- 14.2. Leakage stability
- 14.3. Fluid chemical stability
- 14.4. Temperature stability
- 14.5. Wear stability

#### **15. Storage**

- 15.1. Safety Issues
- 15.2. Shelf Life
- 15.3. Contamination Potential