

# BEARING MAINTENANCE AND LUBRICATION



**MUE243**  
**Mechanical &**  
**Utility**  
**Engineering**

## **COURSE TITLE**

# **BEARING MAINTENANCE AND LUBRICATION**

## **COURSE DATE/VENUE**

28 September – 02 October 2020

London, UK

## **COURSE REFERENCE**

MUE243

## **COURSE DURATION**

05 Days

## **DISCIPLINE**

Mechanical & Utility Engineering

## **COURSE INTRODUCTION**

This five days course covers principles and applications of various types of bearings, including plain journal, ball, and roller bearings. It explains installation, inspection and repair of bearings, deals with specialized bearings. Covers bearing failure modes, lubrication, Failure analysis and services practices.

## **COURSE OBJECTIVE**

- Name the two main categories of bearings and cite their advantages.
- Identify bearings by the kind of support they provide.
- Describe the three kinds of stresses acting on shafts.
- Explain the function of lubricating
- Name and explain the characteristics that are most important in materials for bearings
- Explain bearing repair procedures.

- Identify the functions of the various parts of a typical rolling-element bearing.
- Describe the common methods of mounting bearings
- State typical applications for oil lubrication of bearings.
- Detail the cleaning procedures for different oil lubrication systems
- Give five easy rules for lubricating bearings.
- Identify a principal cause of early bearing failure.
- Describe installation procedures for antifriction and plain journal bearings.
- Name the different types of bearing failure and their causes.
- Tell how bearings should be cleaned and lubricated after inspection

### **COURSE AUDIENCE**

- Technicians and Supervisors
- New Engineers
- Supervisors and Technicians in Refurbishment Facilities
- Bearing Procurement Specification Writers and Supervisors

### **COURSE CONTENT**

#### **Day 1**

#### **BEARING TECHNOLOGY**

Introduction to bearing technology

Bearing description

Terminology

Bearing application

#### **Type of bearings**

#### **Frictional Bearings**

#### **Types of Plain Bearings**

#### **Journal bearing**

Tilting pad bearing

Axial thrust bearing

## Combination Radial/Thrust Bearings

### **Vibration due to bearing**

### **Bearing materials**

### **Plain Bearing Lubrication**

### **Troubleshooting—Plain Bearing Failure**

Wiping

Wiping on a White-metal

Scoring

Erosion

Fatigue

Fretting

Misalignment

Corrosion and Deposits

Lubricant Oxidation

### **Anti friction Bearings**

Classification and Characteristics of Rolling Bearings

Terminology of Bearing Parts

Characteristics

Bearing Life

Sound

Part numbering

Bearing accessories

Bearing selection

### **Day 2**

### **BEST PRACTICE FITTING AND REMOVAL**

**Shaft and Housing Design**

**Housings**

## **Misalignment**

## **Replacement Considerations**

## **Mounting Accessories**

## **Shaft and Housing Fits**

Bearing Fit Criteria

Checking Fit Integrity

Bearing Internal Clearances

Typical Fit Examples

## **Fixing of Bearings**

Tolerances

Mounting Preparation

Cold, temperature and hydraulic mounting

Types of shaft mounting

Mechanical Mounting

Temperature Mounting

Mounting with Sleeves Hydraulically

- How to fit and remove common bearing types
- Using workshop and specialist fitting tools
- Effects of Loose Fit: Rotating Shaft and Inner Ring
- Bearing Arrangements
- Dismounting Procedures
- Removal Techniques

## **Day 3**

### **BEARING DIAGNOSTICS**

#### **Bearing Failure Analysis**

Overview

Bearing Life

Misalignment

Failure Mode Classification

False Brinelling Caused by Static

Vibration

Conducting the Analysis

Securing evidence

#### **Bearing damage and corrective measures**

Flaking

Seizure

Cracking and notching

Cage damage

Meandering wear patterns

Smearing and scuffing

Rust and corrosion

Fretting

Wear

Electrolytic corrosion

Dents and scratches

Creep

Surface matting

Peeling



Fatigue

Misalignment

Lubrication Failure

### **Troubleshooting—Anti-friction Bearing Failure**

Wear Marks

Fatigue

Misalignment..

Damage Caused by Incorrect Fitting

Brinnelling and False Brinnelling

Lubrication Failure

### **Day 4**

### **APPLICATION OF BEARINGS**

**Critical considerations when selecting and applying bearings into machinery**

#### **Bearing housing/bearing isolators**

Cantilevers or overhung impeller pumps

In-between bearing or fully supported shaft pumps

Vertical pumps

#### **Bearing housing protection devices**

Felt and lip seals

Labyrinths

Magnetic seals

#### **Power turbine bearings**

#### **Shaft and Housing Repair**

#### **Maintaining Bearings**

- Dismount anti-friction bearings using a bearing press and/or a bearing puller
- Inspect the bearing for signs of failure

- Clean the shaft and check for taper and out-of-round using the proper measuring instruments
- Clean the housing and check for damage
- Select the proper bearing for replacement, if necessary
- Properly orient a bearing prior to installation
- Mount a bearing using an induction heater and/or an arbor press
- Measure the bearing's inner and outer clearances during installation
- Properly lubricate bearings per manufacturers' recommendations

## **Day 5**

### **TRIBOLOGY AND LUBRICATION Oil**

Oil Lubrication Method

Selection of lubricating oil

Oil quantity

#### **Lubricating oil analysis**

Oil analysis tests

Viscosity

Contamination

Fuel dilution

Solids content

Fuel soot

Nitration



Total acid number (tan)  
Total base number (tbn)  
Particle count  
Spectrographic analysis  
Wear particle analysis  
Ferrography

## **Setting up an effective program**

### **Lubricant audit process**

Baseline signature  
Equipment evaluation  
Routes  
Frequency of monitoring  
Tests  
Post-overhaul testing  
Contractor overhaul templates  
Data analysis  
Root-cause analysis

### **Grease**

Grease Lubrication  
Types of grease  
Grease filling and replacement  
Overfilling and underfilling

## **COURSE CERTIFICATE**

**TRAINIT ACADEMY** will award an internationally recognized certificate(s) for each delegate on completion of training.

## **COURSE FEES**

\$6,150 per Delegate. This rate includes participant's manual, Hand-Outs, buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

## **COURSE METHODOLOGY**

The training course will be highly participatory and the course leader will present, guide and facilitate learning, using a range of methods including formal presentation, discussions, sector-specific case studies and exercises. Above all, the course leader will make extensive use of real-life case examples in which he has been personally involved. 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.

- 30% Lectures
- 30% Workshops and work presentation
- 20% Case studies & Practical Exercises
- 10% Role Play
- 10% Videos, Software or Simulators (as applicable) & General Discussions