

BEARING MAINTENANCE AND LUBRICATION



MUE243
Mechanical &
Utility
Engineering

COURSE TITLE

BEARING MAINTENANCE AND LUBRICATION

COURSE DATE/VENUE

13 - 17 May, 2019

Amsterdam, Netherlands

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

Upon successful completion of this course, the delegates will be able to:

- ✓ 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