BEARING MAINTENANCE AND LUBRICATION

MUE243
Mechanical & Utility Engineering

TRAINIT ACADEMY

COURSE TITLE

BEARING MAINTENANCE AND LUBRICATION

COURSE DATE/VENUE

10 – 14 May 2021

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

- 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 frication 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