



MAESTRO
CONSULTANTS

BEARING MAINTENANCE AND LUBRICATION

COURSE OUTLINE 2020

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TRAINING TITLE

BEARING MAINTENANCE AND LUBRICATION

VENUE

Dubai, UAE

DURATION

5 Days

DATES

08 - 12 March 2020

PRICE

US\$4,000 per attendee including training material/handouts, morning/afternoon coffee breaks and Lunch buffet daily.

TRAINING INTRODUCTION

This five day 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.

TRAINING OBJECTIVES

- 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

TRAINING AUDIENCE

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

COURSE OUTLINE

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

TRAINING CERTIFICATE

MAESTRO CONSULTANTS Certificate of Completion for delegates who attend and complete the training course



METHODOLOGY

Our courses are highly interactive, typically taking a case study approach that we have found to be an effective method of fostering discussions and transferring knowledge. Participants will learn by active participation during the program through the use of individual exercises, questionnaires, team exercises, training videos and discussions of “real life” issues in their organizations. The material has been designed to enable delegates to apply all of the material with immediate effect back in the workplace.