

## Couplings, Gears, Bearings, Seals & Lubrications

### Course general description:

The most critical elements of any rotating piece of machinery will ultimately be the coupling, gear, bearings, and seals. They are the most common cause of equipment failure and can be the center of some of the most expensive break downs. Immense pressure is on repair companies these days to provide high quality repairs at low costs. Knowing how to both identify the root cause of bearing failure and repair the machine to a standard that is better than when it was originally made is the key to great service. This training course explains the purpose of coupling, gear, bearings, & seals and demonstrates how bearings and lubrications reduce friction and maintain the alignment of operating equipment. It explains and demonstrates how to clean and disassemble bearing housings & gearbox and how to dismount, inspect, and mount common types. The importance of full fluid film lubrication and proper lubrication clearance is demonstrated. Additionally, indications of various premature bearing and gearbox failures are discussed with laser shaft alignment training.

### Audience:

This course is designed for:

1. Professionals dealing with the operation and maintenance of rotating equipment
2. New technicians who wish to improve knowledge and skills
3. Those who are involved in condition monitoring of machines
4. Maintenance technicians who are in charge of correcting the machinery problems.
5. Engineers and maintenance planners involved in machine design and machine's condition monitoring.

### Course objectives:

By the end of the training, participants will be able to:

- Understand what friction is and how bearings help reduce it.
- Explain the difference between plain and antifriction bearings.
- Understand the characteristics of plain bearings.
- Know the importance of coupling and their types.
- Recognize the importance of proper bearing lubrication.
- Explain how to prevent coupling, bearing, gear and seal damage.
- Identify the various types of couplings, gears, seals and bearings.
- Choose and apply the proper lubricants for seals and antifriction bearings.
- Discuss how materials wear.
- List the various functions lubricants perform in industry.
- Explain how lubricants reduce friction.
- Classify lubricants depending upon their composition, properties, and additives.
- Understand why certain lubricants are chosen for certain tasks.
- Explain how to safely handle and store lubricants.
- Explain how to manually apply various types of lubricants in an industrial environment.

- Gain practical training skills to help increase knowledge of gears.
- Explain how lubricant-conditioning systems work and how to maintain them.
- Describe how automatic gearboxes systems work and how to maintain them.

**Course duration:**

5 days

**Course location:**

Cairo-Dubai-Istanbul

**Course contents:**

**Day-1**

- Pretest
- Introduction
- Couplings
  1. Safety First - SI Units
  2. Introduction to Mechanical Elements
  3. Types of Shafts Couplings
  4. Couplings uses
  5. Keys
  6. Rigid coupling
  7. Flexible coupling
  8. Coupling maintenance and failure

**Day-2**

- Gears
  1. Gear Function
  2. Gearbox components
  3. Terminology
  4. Gearing ratio
  5. Gearbox assembly best practices
  6. Gear failure modes
  7. Gear Vibration
  8. Gearbox Troubleshooting, Inspection & Maintenance

**Day-3**

- Bearing
  1. Classification & Application
  2. What is friction and how bearings help reduce it.
  3. The difference between plain and antifriction bearings.
  4. Types of plain bearings - Characteristics of plain bearings
  5. Antifriction Bearing - Types of antifriction bearings
  6. Elements of antifriction bearings.
  7. Problems in antifriction bearings.
  8. Preventing premature bearing failure.
  9. Ball Bearing, Taper Bearing, Cylindrical Bearing, and Spherical Bearing

**Day-4**

- Seals
  1. Seal Function
  2. Types of seal
  3. Gasket
  4. O Ring
  5. Packing
  6. Mechanical Seal – Pump Sealing
  7. Labyrinth seal
  8. Dry Gas Seal – Compressor Sealing
  9. Seal Maintenance & Troubleshooting

#### Day-5

- Lubrication
  1. Lubrication
  2. Various types of friction.
  3. How materials wear.
  4. Various functions of lubricants in industry.
  5. How lubricants reduce friction.
  6. Classification of lubricants depending upon their composition, properties, and additives.
  7. Why certain lubricants are chosen for certain tasks.
  8. Safely handle and store lubricants.
  9. How to manually apply various types of lubricants in an industrial environment
- Conclusion
- Posttest

#### **Methodology:**

- 50% lectures & concepts
- 10% Videos
- 10% Case studies
- 10% Exercises
- 10% Discussions
- 10% Software (if applicable or examples)

**Course code: (TEME034)**