



MU142: Shaft Alignment, Dynamic Balancing Techniques & Measuring Tools





Training Description:

Machines that have been precision aligned run longer, and cost less to run. Alignment greatly reduces the life of bearings, seals, shafts and couplings. Also, Machines that have been precision balanced run longer, and cost less to run. Unbalance causes fatigue and reduces the life of bearings and can make looseness and resonance conditions far worse. This course will equip you with the knowledge and skills so that you can use a vibration analyzer/balancer, or a simple sheet of graph paper and protractor, and balance a machine - without even having to remove it from the plant. You will learn how to recognize unbalance and set up the balance job for a successful balance.

This course will equip you with the knowledge and skills so that you can use a dial indicator tool or laser alignment system to precisely align two components together. You will learn how to recognize misalignment and successfully set up the alignment job. After reviewing the important reasons for performing shaft alignment, we will discuss the pre-alignment checks and corrections, including how to identify and correct soft foot. The operation of dial indicators, and cover the rim-face method and reverse-dial method will also be discussed. Not only will we explain and demonstrate the process, also how calculations are performed will also be discussed.

Laser alignment systems will be discussed; the benefits, basic theory of operation, and tips and techniques for successful use. And finally, there will be discussion how to move the machine and deal with all the problems that you are bound to encounter at some stage. We will also review how to deal with thermal growth, and how to approach a larger machine train.

Training Objectives:

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

- ✓ Providing the Participants Good Information on how Shaft Misalignment causes Failures in Equipment's.
- ✓ Explain how they work and understand how to measure run out on mechanical couplings and machinery shafts.
- ✓ Providing the participants with thorough understanding, brief about construction and improve their capabilities and skills required to identify and measure misalignments in different machines and their causes and how to correct or monitor them.
- ✓ Having a detailed understanding of Advanced Time and Frequency Analysis Techniques and have acquired knowledge of Accurate Diagnosis of Antifriction Bearings.
- ✓ Gaining Knowledge of measuring & correction Vertical and Horizontal Plan misalignment aligning Vertical Mounted Equipment.

Training Designed for:

This course is intended for Maintenance Engineers & Highly Qualified Technicians who working in Maintenance Department to give them the Practical Knowledge to achieve accurate alignment and balancing for Shaft of Rotating Equipment Machinery.

Training Program:

DAY ONE:

- ❖ PRE-TEST





❖ Introduction
❖ Module (01:) Soft Foot Checks and Corrections

- Different types of Soft Foot
- Rocking Soft Foot
- Short Foot - Parallel Air Gap
- Even Foot
- High Foot
- Bent Foot
- Squishy Foot
- Induced Soft Foot

❖ Module (02): Importance Soft Foot

- Why is Soft Foot Important?
- Shaft Fatigue
- Bearing Distortion
- Impact on the Alignment Task

DAY TWO:

❖ Module (03): Testing for Soft Foot

- Testing for Soft Foot
- Taking Soft Foot Measurements
- Recording Results
- Using Dial Indicators to measure Soft Foot

❖ Module (04): Correcting Soft Foot

- Correcting Rocking Soft Foot
- Short cut number One: The Casanova Method
- Short cut number Two: The 80% Rule
- Using Feeler Gauges
- Using a "Stair" of Shims
- More Complex Shim Patterns
- Detecting and Correcting Induced Soft Foot
- Mysterious Soft Foot

DAY THREE:

❖ Module (05): The Rim-Face Dial Indicator Method

- Accuracy Issues
- Setup Problems
- Axial End-Float
- Rim-Face Measurement Procedure
- Compensate for Bar Sag
- Alternative Method
- Determine the Alignment Corrections
- Performing the Calculations
- Computing the Offset
- Computing the Angularity
- Computing feet movements



- Shim calculations
- Move calculations
- Example calculations
- The graphical method
- ❖ **Module (06): The Reverse Dial Method**
 - Reverse Dial Procedure
 - Compensate for Bar Sag
 - Performing the Calculations
 - Computing the Offset
 - Computing the Angularity
 - Computing feet Movements
 - Shim and move Calculations

DAY FOUR:

- ❖ **Module (07): Laser Alignment Systems**
 - The basic components in a laser alignment system
 - Benefits of laser alignment systems over dial indicators
 - How do laser alignment systems work?
 - Using a Prism - Return Beam Method
 - Beam Splitter - Single Beam Method
 - Twin Emitter/Detector Pairs - Dual Beam Method
 - Using a horizontal beam and a vertical detector

DAY FIVE:

- ❖ **Module (08): Performing Laser Alignment Measurements**
 - Performing the measurements
 - The 3:00-12:00-9:00 method
 - Swept measurements
 - Getting the results
 - Aligning spacer shafts or jackshafts
 - What if you can't rotate one shaft?
 - What if the shaft can't be rotated easily?
 - What if you can't rotate either Shaft?
 - Limitations of Laser Systems
 - Backlash
- ❖ **Course Conclusion**
- ❖ **POST-TEST and EVALUATION**

Training Requirement:

“Hand’s on practical sessions, equipment and software will be applied during the course if required and as per the client’s request”.

Please note that the above topics can be amended as per client’s learning needs and objectives. Further, it should be forwarded to us a month prior to the course dates.





Training Methodology:

This interactive training course includes the following training methodologies as a percentage of the total tuition hours:-

- 30% Lectures, Concepts, Role Play
- 70% Workshops & Work Presentations, Techniques, Based on Case Studies & Practical Exercises, Software & General Discussions
- Pre and Post Test

Training Certificate(s):

Internationally recognized certificate(s) will be issued to each participant who completed the course.

Training Fees:

As per the course location - This rate includes participant's manual, hand-outs, buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

Note: The 5% VAT (Value Added Tax), will be effective starting 01st of January 2018 as per the new regulation from the UAE Government. The VAT applies for all quotation both for local and abroad.

Training Timings:

Daily Timings:

07:45 - 08:00	Morning Coffee / Tea
08:00 - 10:00	First Session
10:00 - 10:20	Recess (Coffee/Tea/Snacks)
10:20 - 12:20	Second Session
12:20 - 13:30	Recess (Prayer Break & Lunch)
13:30 - 15:00	Last Session

For training registrations or in-house enquiries, please contact:

Aisha Relative: aisha@cmc-me.com

Tel.: +971 2 665 3945 or +971 2 643 6653 | Mob.: +971 52 2954615

Training & Career Development Department

