

Hands-on Precision Maintenance Laser Alignment: Course

Precision Maintenance Laser Alignment What attendees will learn and how to perform

Rough Alignment

- ⇒ How to Perform a Rough Alignment
- ⇒ Identify and correct distinct types of Soft Foot; Short Foot and Angled Foot
- ⇒ Understanding of Soft Foot and its consequences if not corrected
- ⇒ Proper methods to create "Step Shims"
- ⇒ Real world example shown of how Soft Foot affects gear mesh within a gearbox
- ⇒ Jack bolts **A MUST** for precision alignment success
- ⇒ Pipe Strain What it is, impact, and how to eliminate
- ⇒ Hands on exercise performing a "Rough Alignment" on our simulators highlighting its effects on the machine vibration and amp draw

Common Assembly Errors

- ⇒ Understanding "Assembly Errors" and how they affect alignment, balance, and the overall life of machine assemblies
- ⇒ Understanding of keys and keyways; proper fitment, material, length, and orientation
- ⇒ Real world examples of improper key lengths and a proper fitment simulator
- ⇒ Proper fitment for couplings and how to calculate it
- ⇒ Machine Eccentricities and how to find them; couplings bored out of center, bent shafts, couplings bored out of square, and poor bearing shaft and housings fits
- ⇒ Understanding of set screws; proper torque, orientation, etc
- ⇒ Basic identification of common fasteners and associated grade markings for understanding of proper torques needed
- ⇒ Understanding and use of torque wrenches; types, proper torque applications, lubrications, calculations, and patterns
- ⇒ Coupling Gap What is it, why is it important, and how to measure and set
- ⇒ Hands on exercise removing assembly errors from our simulators which proves their effect on vibration readings and amp draw

Alignment – Precision in No Time

- ⇒ Perform Precision Alignment using Correct Procedures and Principles
- ⇒ Precision Maintenance Procedure & Worksheet Step-by-Step Instructions for a proper precision alignment
- ⇒ Dial Indicators & Graphing Alignment Process designed for students to understand "Optimum Move" and the calculations going on within the laser
- ⇒ Laser alignment using your laser or lasers provided by HPMS
- ⇒ Hands on exercise performing a precision alignment on our simulators which proves the effects of precision alignment on vibration and amp draw



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⇒ Real world example showing how to plot from laser foot readings to perform a "Optimum Move" when you are bolt bound or base bound. This is extremely useful if your laser does not have the optimum move feature.

Thermal Growth

- ⇒ Understanding of thermal growth and its effects on equipment
- ⇒ Thermal growth calculation sheets and real-world exercises showing proper calculations
- ⇒ Hands on demonstration showing thermal growth

Balance

- ⇒ The meaning of *Balance* and *Unbalance* → Effect on Rotating Equipment
- \Rightarrow Balancing standards \rightarrow How to specify to reduce vibration (G6.3, G2.5, G1.0)
- ⇒ How not to disrupt factory balance on installation, commissioning, and operation

Lubrication, Basic Mistakes to Avoid

- ⇒ Identify and Eliminate the Common Lubrication Mistakes that Kill Bearings and Cause Downtime & Waste
- ⇒ Lubrication Best Practices Oil & Grease
- ⇒ Re-lubrication → Intervals, Lubrication Type, Calculating Correct Amounts, and Proper Lubrication Practices & Procedures

Couplings

- ⇒ Various types of Couplings
- ⇒ Difference between long life vs. failure, smooth operation vs. downtime, and making vs. losing money
- ⇒ 10-Step Grid Coupling Inspection Procedure
- ⇒ 10-Step Gear Coupling Inspection Procedure
- ⇒ Coupling Gap and Thermal Growth

Thermal Growth

- ⇒ What is Thermal Growth how to account and compensate
 - How to calculate and apply "Average Temperature" for both Driver & Driven Equipment
 - Step-by-Step Instructions to determine Thermal Growth Alignment Adjustments

Belt Drives

- ⇒ Terminology: Belts, Sheaves, Pulleys, & Bushings
 - Proper installation & inspection standards and procedures for all components
- ⇒ Various Types and Applications of Belts



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- ⇒ Torque-Flex, Hy-T, Compass-V-Steel, Wedge, Torque Team, F.H.P. V-Belts, and More
- ⇒ How to use supplied *Precision Maintenance Field Worksheet* for Belt Applications

4 Appendix: Supporting Documents & Reference Guides

- ⇒ Reverse Dial Indicator Data Sheet | Vertical & Horizontal
- ⇒ Soft Foot Check Form
- ⇒ Thermal Growth Calculator
- ⇒ Precision Maintenance Filed Worksheet | Direct Drive & Belt Drive
- ⇒ Goodyear Belt Tension Tables
- ⇒ Gates Belt Tension Tables
- ⇒ Metric to Imperial Conversion Charts
- ⇒ Minimum Tools Required for Precision Maintenance
- ⇒ Suggested Tools for Precision Maintenance