



This is the overview for the two day training course in machinery installation.



During this course a strong emphasis will be made in the critical areas of the installation process, pre-installation check list, soft foot measurement and correction, measuring the misalignment and moving the machine units.

On day one the emphasis is on the pre-alignment work, soft foot etc. We perform an alignment with a dial set using the reverse dial indicator method. This is the same method that the laser uses but more importantly it allows us to graph the actual misalignment. This graphical picture allows the participants to visually see the misalignment which leads to a better understanding of the process. We end the day with belt and sheave alignment using traditional methods and laser technology.

On day two we concentrate on laser systems starting with the fundamentals of what a Laser is. We introduce the participants to Geometric measurement and demonstrate Straightness and Flatness measurement and Square.

For more details on all the topics covered please see the overview (below).

OVERVIEW FOR TWO DAY TRAINING IN MACHINERY INSTALLATION - DAY 1

The introduction segment of this course begins with a review of the current maintenance strategies that are used in industry today. Reactive/Preventive/Predictive and Proactive maintenance. When to use them. What are the pro's and con's.

Focusing on Condition based maintenance we emphasize the fact that the installation of all equipment is critical to its operational life expectancy. It has to be done right the first time.

We set the stage by stating the goals we want to achieve in this two day course and demonstrate the benefits of precision alignment. We discuss what is the expected life of your present equipment and what it should be. Then a review of the other methods of alignment is done from straight edges to laser systems pointing out the positive and negative aspects of each method.

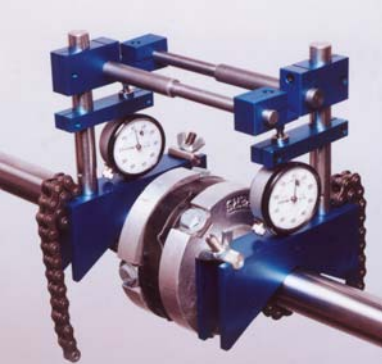
We move to the next segment and show that the best way to perform precision alignment is in a series of three stages. (Preparation, Measurement and Movement). At this time we stress the importance of completing a pre-alignment check list. This includes such things as key way length, coupling eccentricity, lockout etc.

Next, the participants will learn what Soft Foot is, what it's effects are, how to find and remove it and what soft foot tolerance's are acceptable. This is a very important part of the course. Soft foot is the cause of major equipment problems such as, excessive vibration resonance and the inability to perform precision alignment.

At this point we examine the dial system that we will be using. We demonstrate dial sag and how to compensate for it. We continue this segment by mounting the Reverse Dial Indicator Fixtures onto the test machine and demonstrate the procedure for taking the indicator readings.

We are now in a position to introduce the participants to the graphical solutions for misalignment using the line to point procedure. Taking into consideration that not all the participants have used this procedure before, we spend the time to make sure that all are comfortable with this before moving on.

A graphical layout of the test machine is plotted onto graph paper, all graphical lines are defined. Using the dial indicator reading, we calculate the graphical misalignment. All the participants can now visually see the corrections that are necessary.





The last step is moving the machine. Using the test machine we demonstrate the best method to achieve this. We then take the new readings and re-plot the graph. This is a very hands on training program. All the participants are encouraged to practice mounting the dial fixtures, performing the graphical solutions and the moving of the machine.



We end the day with a belt alignment and perform an alignment on the training stand. Pointing out the common belt and chain installation problems.



END OF DAY ONE



DAY TWO

Day two begins with a review of the first day's work.

We are now in a position to introduce the participants to Laser fundamentals. Moving to Geometric measurement and demonstrating Straightness and Flatness measurement. We then discuss base problems (twist) and how to measure them using the laser.

Next we introduce the shaft alignment system and demonstrate all of the instruments components plus a review of their uses. The instrument is mounted on a training rig and an alignment is performed. The system is then disassembled and each participant has the opportunity to practice the assembly and alignment procedure on the training rig. We spend the time to make sure that all are comfortable with this before moving on. We continue this segment using the other shaft alignment programs such as easy turn, machine train etc.



The last step is moving the machine. Many times precision is lost due to poor movement techniques. Using the foot lock program and the training rig we demonstrate the best method to achieve this. This is a very hands on training program. All the participants are encouraged to practice mounting the laser and performing an alignment.



We finish by discussing foot and base problems and how to use a simple vibration measurement to detect softfoot and how vibration can qualify a machinery installation.

LIST OF TOPICS COVERED - DAY 1

- Introduction
- Why Precision Alignment ?
- Summary of Alignment Methods
- Stages in Performing Alignments
- Pre-Alignment Checklist
- Soft Foot : What is it ?
- Effects of Soft Foot
- Basic Checking and Correcting
- Removing Soft Foot
- Soft Foot Tolerance
- Graphical Solutions for Misalignment
- Reverse Dial Indicator Method
- Recording Dial Indicator
- Procedure for taking Indicator Readings
- Graphical Layout of Machine Dimensions
- Definitions of Graphical Lines
- Graphical Alignment Calculations
- Sheave alignment
- Mismatched sheave
- Runout and skew measurement
- Soft Foot on belt systems
- Moving the Machine



LIST OF TOPICS COVERED ON DAY 2

- Review of day 1
- Introduction to laser based measurement
- Geometric Measurement
- Straightness and Flatness measurement
- Frame twist correction
- Overview of Laser shaft systems
- Horizontal and Vertical shaft alignment
- Easy Turn just moving the heads 40 degrees
- Machine Train alignment
- Bolt bound machines
- Moving the Machine
- Thermal Growth
- Procedure for Calculating Thermal Growth
- Overview of vibration Measurement
- How to measure, where to measure vibration.
- Verification measurement (ISO standard)
- Soft Foot Induced Vibration
- Running Machine Vibration Test for Soft Foot



Any additional time is now used for review and practice.