Shaft Alignment Training PPT Presentation Slides
Sample Slides from the 1-Day Shaft Alignment Training Course

Shaft Alignment Training Course Module 1

**Module 1 Outcomes:**
- After successful completion of this Module the student shall be competent to:
  - Discuss the benefits of proper alignment in plant reliability
  - Discuss the adverse effects of misalignment upon machine operation
  - Define alignment and its types
  - Identify the three types of an alignment tool
  - Determine the advantage and disadvantages of each type of measurement tool
- Major Sources of Vibration:
  - Taper-handles, there are no published standards for alignment tolerances
  - Purple/Blue tapes:
    - Double coupling will accumulate misalignment
    - Taper-handles will accommodate misalignment
    - Criteria for coupling alignment are satisfactory for the machine
  - Attention to alignment issues above would be a very productive place to start any reliability programme

**Alignment Issues:**
- Vibration issues: there are no published standards for alignment tolerances
- Pocket/Blue tapes:
  - Double coupling will accumulate misalignment
  - Single bearing will accommodate misalignment
- Criteria for coupling alignment are satisfactory for the machine

**Module 2 Outcomes:**
- After successful completion of this Module the student shall be competent to:
  - Discuss the benefits of proper alignment in plant reliability
  - Discuss the adverse effects of misalignment upon machine operation
  - Define alignment and its types
  - Identify the three types of an alignment tool
  - Determine the advantage and disadvantages of each type of measurement tool

**Shaft Alignment Training Course Module 2**

**Pre-Alignment:**
- Inspect machine bases, foundation and feet for cracks, warped surfaces, loss of grinding, corrosion, foreign material, and burn and repair as necessary prior to shaft connection.
- Inspect machine bases, foundation and feet for cracks, warped surfaces, loss of grinding, corrosion, foreign material, and burn and repair as necessary prior to shaft connection.

**Pulled Threads, Capped Washers:**
- Remove both machines to inspect foot and base, drill both.
- Check for pulled or damaged threads.
- Inspect washers, replace clogged washers.
- Ensure that holes do not restrict movement to achieve alignment
- You lose clamping areas with enlarged holes.
- Cannot remove the bolt.
- Ensured hole, clogged washer can cause machine to return to centered spot.
- You can make slicker, larger washers.

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Shaft Alignment Training Course Module 3

Machine frame distortion is the result of changes that occur within a machine frame due to one or more of the feet being “soft” under static conditions, to when the machine is not operating.

The more fundamental causes of Static Soft Feet include:
- Flexible bases
- Dirty or rusty bases
- Untreated bases
- Corroded bases or feet
- Bent feet
- Skewed feet
- Improper alignment
- Improperly supported pipelines or ducts

Effect of Soft Foot on Bearings

Shaft Foot Distorts Armature Air Gap, causes eccentric operation

Effects on an Alignment from Soft Foot Distortion

Checking & Correction of Soft Foot

perform Rough in alignment
- With both drive belts loose use feeler gauge to determine gap between friction bushings

Shaft Alignment Training Course Module 4

Assembly:
- Often the partial assembly from a previous job can directly be reused, saving time
- Mount the base on the shaft using the chain system; mount the second base so that the instrument blocks in the bridge are on opposite sides of the shaft
- Select parts, faces and extensions of the instrument site required
- Edge of the mounted base on the tube with the reference line on the top of the bridge

Compensating for Bar Sag
Method A, mechanically:

Compensating for Bar Sag (A)

Compensating for Bar Sag (B):

The Update Procedure Alignment Kit
- Has been designed for the Reverse Indicator method but can also be used for film and tape
- Will maintain Bar Sag, but this will not be allowed for
- Will maintain indicator setup errors
- Is easily installed and uninstalled, and does not require complete disassembly
- Will cover a wide range of coupling speeds and heights

Setting the Level
- Set the balls evenly on top of the bridge and rotate the shafts until the bubble is in the center
- Place the level bars in the end of the tube on the centerline of the bridge
- Return the level to the tube until two lines straddle the bubble
- It is not possible to accurately return the shaft to the desired positions for subsequent readings

Determining the Sag
- Before taking readings the Bar sag must be established
- Stop the fixture intact, remove them from the shaft by disconnecting the chain
- Mount an opinion of body large diameter right pipe
- Set the shaft to zero and ensure N°. The indicators should return to zero
- At 13.00 on the shaft to zero, return to 0.0
- This must be compensated for 2 methods
Shaft Alignment Training Course Module 5

Module 6 Outcomes:
- After successful completion of this Module the student shall be competent to:
  - Prepare and use a graph sheet for reverse indicator alignment
  - Take the measurement from a dial chart (note for thermal growth and subtract the shaft lines for horizontal and vertical alignment)
- Dimensional and angular measurements required to complete the alignment
- Measure the required process to identify the optimum arrow to the case of base line or horizontal machines
- Actual indicator readings (vertical) are recorded here: target to the left, right to the right
- Note the provision for the flag

Shaft Alignment Training Course Module 6

Module 6 Outcomes:
- After successful completion of this Module the student shall be competent to:
  - Prepare and use a graph sheet for reverse indicator alignment
  - Take the measurement from a dial chart (note for thermal growth and subtract the shaft lines for horizontal and vertical alignment)
- Dimensional and angular measurements required to complete the alignment
- Measure the required process to identify the optimum arrow to the case of base line or horizontal machines
- Actual indicator readings (vertical) are recorded here: target to the left, right to the right
- Note the provision for the flag

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Shaft Alignment Training Course Module 7

Module 7 Outcomes:
- After successful completion of this Module the student shall be competent to:
  - Describe the methods used to achieve controlled movement of machines in the horizontal and vertical planes.
  - Discuss the precautions required to achieve controlled movement of machines in the horizontal and vertical planes.
Regardless of the alignment method used, dial indicators are less precise, the final result and the time taken can only be as good as your ability to move the machine to the desired location, within the required tolerances.

Controlled movement in the vertical plane in the product of:
- Feet and base lines of since poles, etc.
- Using suitable guide material - preferably patterned material, and maintaining number of (N) with this number unmarked between them, and:
  - Reduction, or elimination, of self-feet
  - Avoiding damage to feet and base columns filling the machine.
  - Correct torque as built down bolts after a skin change.

Horizontal movement using only one indicator.

Shaft Alignment Training Course Module 8

Module 8 Outcomes:
- After successful completion of this Module the student shall be competent to:
  - Describe the equipment and instruments that can be used in the course, including the use of dial indicators to align the components.
- Describe the benefits of using indicators related to alignment techniques.

The challenging question....
- When is the alignment close enough?
- Consider:
  - Machine criticality
  - Machine life
  - Strategic consideration
  - Attitude: “good” or “good-enough

Alignment issues:
- Unlike bearings, there are no published standards for alignment tolerances.
- Popular misconceptions:
  - Belief that valve groupings require more accurate alignment than others.
  - All alignments are critical.

Companies who are getting results.....
The following recommended tolerances have been obtained from companies who are achieving significant savings by using high-precision alignment tools. These companies have implemented programs as part of a movement toward greater plant reliability. These are to be regarded as guidelines from which to develop your own standards.

Tolerances for one major company:
- Maximum Offset = 0.038mm
- Maximum Offset = 0.045mm
- Maximum Offset = 0.050mm

Tolerances as proposed by Upine International, Inc.
- Maximum Offset = 0.040mm
- Maximum Offset = 0.045mm
- Maximum Offset = 0.050mm

Bearings Life Expectancy

- The tighter the tolerance the greater the operational life of the machine.
- Bearing Life Expectancy

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