

Time To Align

Six pre-alignment steps set the stage for precision shaft alignment

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A well trained aligner can accomplish a precision shaft alignment in one or two moves virtually every time. This is true whether the aligner uses laser tools or dial gauges to measure the misalignment—and I'm talking about making shaft centers collinear to within a few thousandths of an inch. Good results are almost always dependent on understanding of basic alignment processes, doing the necessary preparation, knowing when satisfactory results are achieved, and having confidence in the tools that he or she is using.

In my experience, I've witnessed aligners making move after move with unpredictable results, and see their frustration levels increase as they lose confidence in tools which are more than capable of delivering precise measurements. This doesn't have to happen, and the benefits of achieving close alignments are documented—precision shaft alignment of direct coupled rotating machines extends bearing life and reduces vibration. Despite compelling reasons to align precisely and the widespread availability of tools to accomplish the task, many companies still struggle with this fundamental maintenance process.

Neglecting to spend 15 to 30 minutes in preparation causes unpredictable alignment outcomes (and frustration), regardless of which alignment tool the user is operating. These six pre-alignment steps are essential to achieve good shaft alignment results:

Pre-alignment Step	Why	Comments
1. Check run out. <i>(You are looking for coupling concentricity, roundness, and shaft straightness)</i>	Shaft alignment is about reducing forces. Eccentricity and bent shafts generate dynamic forces.	Use a dial indicator and a magnetic base. Each side of the coupling is measured by rotating the shafts with the indicator in a fixed position.
2. Clean up.	Dirt, scale, and old shims cause the inconsistency in shaft centerline positions when bolts are loosened and tightened.	The old shims are removed one at a time. The area under the foot is cleaned. Measure one old rear foot shim pile and replace both rear foot shim piles with the same amount. Measure one old front foot shim pile and replace both front foot shim piles with that amount.
3. Make a rough alignment.	Remove coupling forces that can result in unrepeatable alignment measurements.	Use a scale to correct gross vertical and horizontal misalignment.
4. Correct obvious soft foot.	Getting the motor feet in a common plane with the base eliminates bearing misalignment and facilitates predictable alignment corrections.	With all the bolts loose, simply feel for loose shim piles. If you can move a shim pile with the aid of a pair of pliers, you will need at least .003" under the soft foot.
5. Establish a tightening sequence that will be followed after each alignment correction.	Small machines move easily. This step minimizes movement that can spoil a precision correction.	Use at least 3 passes of the sequence. Think about how you torque the head of an engine block.
6. Correct final soft foot.	To facilitate predictable alignment corrections.	Final soft foot is done by loosening 1 bolt at a time. While most laser systems incorporate a soft foot function, I prefer using a .002" feeler gauge at the foot to measure final soft foot.

By performing these easy steps, you have set the stage for predictable alignment results. You will have removed coupling forces that move the shafts within their clearances. The bearings will have equal loading and the shaft rotational centers will repeat their own positions. Therefore, alignment calculations will be predictable, resulting in precise alignment in one or two moves. **IMPO**