Fluke 831
Laser Shaft Alignment Tool

Frequently asked questions

General

Q: Why do teams keep replacing the same bearings and seals?

A: They need to find the root cause of the problem – fix the root cause, don't just fix the symptom.

- 50% of rotating machine damage is directly related to misalignment
- Most teams just replace bearings and seals because alignment takes too much time
- Teams that perform precision shaft alignments find that bearings would last for an extended period of time
- Laser shaft alignment tools provide quick, easy precision alignment to fix root cause on most machines in the plant (not just a few)

Q: Why is precision alignment so crucial?

A: There are several big benefits.

- Decreased power consumption
- Longer machine lifecycle
- Less vibration leading to less wear (other faults)
- Lower temperatures on bearing, coupling and lubrication
- Reduced costs for storing spare parts

Q: How to justify the cost of alignment for more than a few critical machines?

A: Utilizing Adaptive Alignment technology, the Fluke 831 offers an unbeatable price-performance ratio.

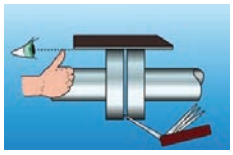
Adapt to the asset – Single-laser technology adapts to virtually all rotating assets.
Adapt to the situation – Automatically adjust in real-time for challenges such as initial gross misalignment.
Adapt to the team – Support every technician's level of experience by eliminating user errors and enabling team collaboration through the Cloud.

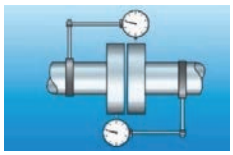
- ✓ Technicians to conduct quick, easy precision alignments that get to the root cause of the alignment issues of most machines in a plant.
- ✓ Align EVERY machine that is overhauled or repaired because the savings from bearings, seals, production loss, energy waste, etc. can be multiplied by hundreds of machines to save thousands of dollars a year.

Q: Why bother to precision align the machine when it is fitted with flexible couplings that are designed to withstand various working operation states?

A: It is true that couplings are designed to withstand various states and loads. However, forces from misalignment or looseness greatly reduce the life of a flexible coupling. These forces are also transferred to the bearings and seals, causing them to wear faster as well. Precision alignment saves components and avoids equipment failure.

Q: I already use either a straight edge and feeler gauge or dial indicators. Why would I want to switch?





A: Feeler gauge and straight edges rely purely on the eyesight of the alignment technician to ensure the corrections are made properly, while dial indicators are prone to several different errors and complex math calculations that result in repeated checks to ensure the corrections are made properly.

Some misalignment will almost always remain due to low resolution and accuracy. Using the Laser Shaft Alignment tool, a laser is projected onto the reflector mounted on the opposite shaft giving accurate results of all alignment parameters monitored simultaneously. Precision shaft alignment saves energy, time, and makes your machines run smoother and longer.

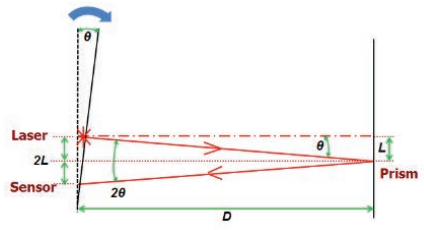
Q: We don't have time to align machines – how can we afford to use the Fluke 831?

A: Most customers are experiencing production losses from machine failures, high power consumption from poor running machines, high rate of repairs to mechanical seals and pumps, and high maintenance costs due to short machine life. They typically keep replacing the same bearings, seals and couplings time and time again without finding and fixing the root cause – misalignment. With misalignment of machines present 50% of the time in a typical plant, users can't afford to run their operations without the Fluke 831.

Precision alignment is no longer a long, drawn out procedure that takes hours or requires a highly skilled expert. The 831 is a simple, easy-to-use tool designed specifically for precision shaft alignment of hundreds of standard machines that have been ignored for years. Perform your alignments quickly and start saving money from lost production, unnecessary repairs, and wasted energy.

Technical

Q: What is the difference between Single & Dual laser technology?

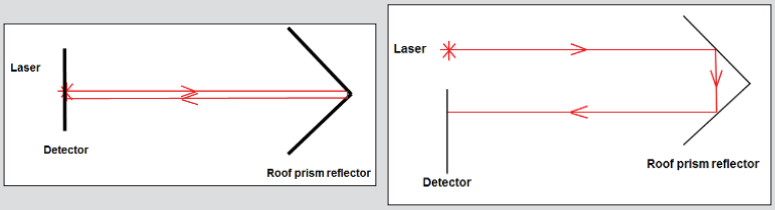


A: Single laser measurement has the following benefits over dual lasers:

- ✓ One laser / sensor and a prism are easier to mount and setup
- ✓ One laser/sensor = less cost, service, and calibration
- ✓ One adjustment instead of two – move prism only (not laser)
- ✓ Twice the distance (laser to prism and back to sensor) increases sensitivity
- ✓ Increased displacement (2L) increases sensitivity & minimizes coupling play
- ✓ Co-linear laser (vice large sensors) is less susceptible to backlash errors
- ✓ Original technology developed and patented by industry leader Prüftechnik

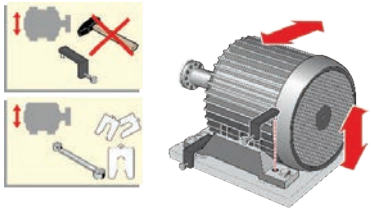
Q: What other ways can a single-laser beam help to minimize the errors from backlash?

A: Co-linear laser optics system (single laser) is less susceptible to backlash → less error means more accurate and more repeatable. In a two-laser system or a single reflected laser system with a large sensor (see image on the right), the path of the laser to the sensor has an increased offset, which can be more affected by coupling backlash.



In a Co-linear single laser system (see image on left), the path of the laser to sensor is on a Co-linear path, which is much less susceptible to backlash.

Q: Precision shims and machine puller → why are they needed?



A: Precision alignment means using precision tools and materials.

- ✓ Many technicians use whatever is available to realign the machine vertically: sheet metal, scrap metal, aluminum cans, anything they can find. Unfortunately, this takes time and does not lead to the best alignment. Use precision shims to perform the job right the first time and get the machine back online. Users don't have time to waste when every minute of downtime can be costing money. They can't afford to do a poor job because then they will be forced to come back and redo the job to make it right (and they don't have the time to do the job twice). See optional shim kit.
- ✓ Many technicians use whatever is available to move the machine horizontally: worse case is they often use a hammer. This causes damage to the machine and is never a good idea. Unfortunately, many companies do not think about precision alignments when they install machines. If the customer does not have machine pullers on their motors, they look into adding pullers during their next maintenance shutdown. They should schedule a local service group to come in and install economical machine pullers on the critical machines first, and then the vital machines during the following maintenance shutdown. The benefits of precision alignments and the time saved using machine pullers will quickly offset the cost to install machine pullers.

Q: What is resolution and accuracy – what do they mean?

A: **Resolution: 1 µm; Accuracy (avg): > 98%. What do they mean?**

Resolution is the smallest amount of displacement that the system can detect/measure. Resolution: 1 µm

Accuracy is the precision of the displacement/measurement. Accuracy (avg): > 98 %

Q: Should the bracket assemblies be mounted on the shafts or the coupling?

A: The chain type bracket may be mounted either directly on the shaft or on the coupling as the shafts and connected coupling are rotated together.

Q: Is there a minimum / maximum distance required between the sensor/ laser and the reflector (prism)?

A: **Minimum**: The components must never touch one another during rotation of the shafts.

Maximum: The recommended maximum distance is ca. 5 m (197 in). About 15 feet.

Q: How exact must the inputted dimensions be?

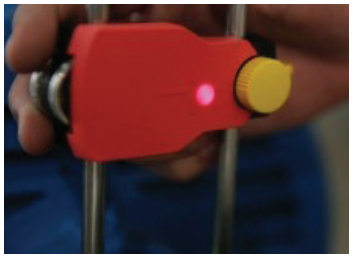
A: Readings within +/- 2 mm (+/- 1/16 in.) taken with the standard tape measure are sufficient.

Q: How should motor foot dimensions be entered when measuring large non-symmetric machines?

A: The dimensions should be taken from the center of the motor foot bolts.

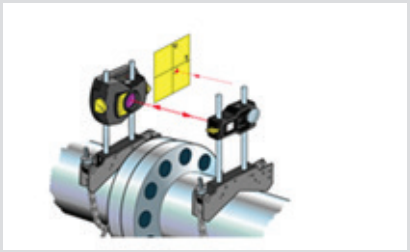
Q: What could cause the laser beam not to be seen on the prism dust cap?

A: Lighting condition of the surroundings is extremely bright.



Q: How to handle gross initial misalignment or long distances without the need to have big, heavy sensors or need to perform a pre/rough alignment?

Benefit: Always able to document and report the initial machine alignment position.



A: Measurement range may be extended manually in what some might call 'Freeze-frame'. This range extension allows the adjustment of the laser beam such that it does not miss the detector surface when measuring shafts with initial gross misalignment or angular misalignment over large distances.

During measurement, before 'Laser End' is displayed manually reposition the laser within the XY view.

On the prism unit, use the yellow horizontal angle adjustment knob and the vertical position adjustment thumbwheel to
1) adjust the laser dot such that it is positioned
2) inside the square target.

1

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Q: What are the different tolerance tables available for shaft alignments?

A: Commonly available tolerance tables:

- Acoustical Society of America (ASA) developed shaft alignment tolerances for both short flex and spacer couplings on standard rotating machinery. These tolerances are an approved American National Standards Institute (ANSI) specification.
- User defined tolerances – edit user defined tolerances, the edited values are then displayed
- Asymmetric and symmetric tolerances
- Tolerance table based on coupling format

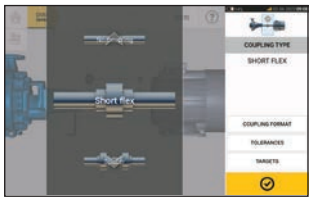
Q: What is thermal growth? What is a thermal growth calculator?

A: Thermal growth is the movement of shaft centerlines associated with or due to a thermal change in machinery temperature between the idle and operating conditions.

The calculator (not shown) is used to calculate thermal growth compensation if no other values are available.

Thermal growth is calculated from the material coefficient of linear thermal expansion, expected temperature difference and length of the shaft centerline from the shim plane.

Q: What are the different coupling types typically encountered during shaft alignments?



A: The following coupling types are available for selection:

- Short flex — These couplings feature fitted transmission elements with play (such as teeth, claws or bolts) or elastic connecting elements like rubber tires or springs.
- Spacer shaft — When the coupling halves are joined by a spacer element, its length must be entered.
- Single plane — The coupling halves are bolted directly together. Loosen the bolts before taking measurements, since they would otherwise distort the true alignment condition.
- No coupling — This coupling format is intended for use with for example CNC machines. In this format, the length between the two shafts must be entered.

Storage and installation

Q: How is the tool and mounting hardware stored and transported?

A: The device, hardware, brackets, etc. are all stored in a carry case ready for transport and quick installation.

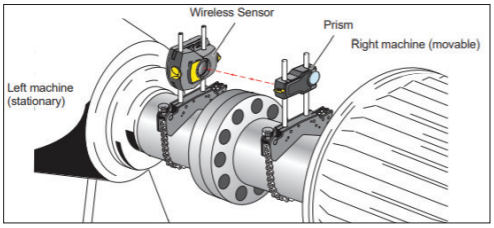
Correcting shaft misalignment

Q: What is the checklist that should be performed prior to the alignment?

A: Pre-alignment checklist:

- Base OK? Shims OK? Maximum of 4 shims
- Bent bolts? Cupped washers?
- Hold-down bolts, jacking bolted lubricated?
- Pipe/bracket strain eliminated?
- Shafts OK? Run out, bending, coupling play
- Coupling OK? Proper fit on shaft, looseness, eccentricity, flexible elements OK?
- Soft foot eliminated? Targets, tolerances established?
- Finally, machine tagged out – padlock on breaker?

Q: How are the units mounted on the shafts?



A:

✓ Remove the laser/sensor bracket assembly from the left side of the case and mount the chain bracket onto the shaft to the left side of the coupling (which is typically the stationary pump).

✓ Mount the laser as low as possible but high enough to clear the coupling.

✓ Remove the prism assembly from the right side of the case and mount it onto the shaft to the right side of the coupling (which is typically the moveable motor).

Q: How to follow the 3 quick, easy steps?

A: Take out the Quick Reference Guide and follow it during the alignment: Dimensions – Measure – Results / Corrections

Q: How to quickly and precisely align a machine?

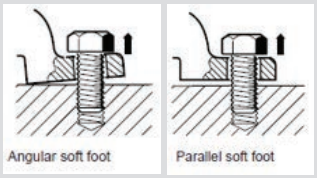
A: 3 simple steps:

1. Dimensions:
Machines dimensions (and relevant alignment specifications) are entered for later computation.

2. Measure:
The "Active Clock" measurement mode take readings from up to 5 sectors for precision results.

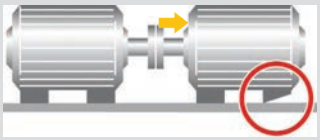
3. Results/Corrections:
The coupling results – with tolerance evaluation, as well as the feet values with correction arrows are digitally and graphically displayed on the screen.

Q: How to follow the steps of the Soft Foot check?



A: If poor results are found during the alignment, check for Soft Foot. Follow the steps in the Quick Reference Guide:

Soft Foot tolerance = 0.06 mm (0.002 inch)



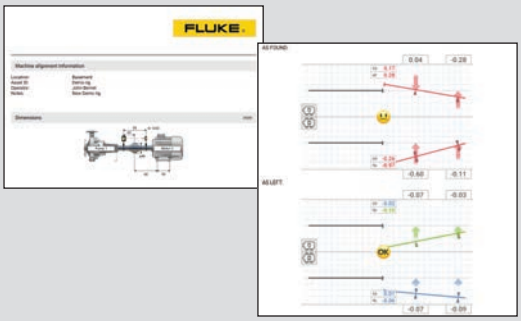
Q: What should I check if the alignment does not work?

A: **Causes that may influence the measurement:**

- Incorrect or loose mounting of bracket frame, support posts
- Incorrect or loose mounting of sensor and prism on the support posts
- Loose machine anchor bolts
- Coupling OK? Proper fit on shaft, looseness, eccentricity, flexible elements OK?
- Unstable or damaged machine foundation
- Mounted components strike machine foundation or machine casings or frame during shaft rotation
- High breakaway torque from rotatable and non-rotatable shafts
- Extreme Coupling backlash
- Change of rotational direction during and between measurements
- Mounted components moved during shaft rotation
- Uneven shaft rotation
- Change in temperature within machines
- External vibration from other rotating machines
- External pipe strain
- Soft Foot on the machine feet

Documenting results, before and after

Q: How do you Document the results?



A: After alignment corrections – Save the file, and then Print a PDF report to document your work.

Hint: Save & print a PDF report at the beginning ('Before' or 'As Found') and print another PDF report at the end: ('After' or 'As Left'). This will document the correction that was made during the alignment.

Finally
Switch the device off, remove components from shafts, and store them in case

For more detailed information see the Online Help (User Manual).