

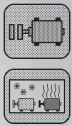
FIXTURLASER[®]

OL2R

Offline-to-Running Fixtures



Fixturlaser AB develops, manufactures and markets high precision alignment and measurement instruments for industrial purposes.



Your benefits from using the Fixturlaser OL2R fixtures and a shaft alignment system:

- Provides true information on running machine position
- The measurement results require no additional evaluation
- Only two mounting points required
- Results can be printed instantly or stored
- Robust product enduring in tough industrial environment

Are you ready for the truth?



... about your machine's running position? Rotating machines are easy to align when cold — but are they aligned when running? Like people, machines have individual characteristics requiring individual treatment for optimum performance. Fixturlaser introduces a new and unique product to solve this dilemma: the Fixturlaser OL2R fixtures.

Problem

Machines move from offline to running conditions. How much and in which directions depend on a number of different factors, such as work load, machine casing material and thickness, pipe strain, fluid pressure in pumps, draft, and more. In order to know how much we have to compensate for this movement, when performing an offline shaft alignment, we need to measure the movement. Like machines grow and move differently.

This means that each machine is unique and therefore must be measured to determine true on line position. Without this information, precision alignment of critical machines with high rpm will not be achieved.

Solution

With the OL2R fixture and a Fixturlaser Shaft alignment system, you can measure the dif-

Have you ever had this experience?



Continuous problems with high levels of vibration even though the machines have been aligned recently. The cause can be that the alignment was performed in cold condition. When compensating with the exact compensation values from an OL2R measurement, precision alignment can be performed and the high vibration levels are likely to disappear.

ference of the shaft positions from offline to running condition, *while the machine is running*. The measurement result is then used in the shaft alignment process. On the following pages you will find out more about the measurement procedure and the benefits of performing it.

More information

We can also provide you with a white paper to increase your knowledge within this field. Visit our web site www.fixturlaser.com for further information.

A Unique Offline To Running Measurement Solution

The Fixturlaser off-line to running measurement method is unique. Performing OL2R measurement the Fixturlaser way you use the same measurement system as you do for ordinary shaft alignment. For you this means that you only need an optional fixture and an additional software with your Fixturlaser Shaft alignment system. Other measurement methods uses separate measurement systems for off-line to running measurements and shaft alignment. Another advantage with the Fixturlaser way is that it uses the same measurement principle as the shaft alignment measurement. When working with other methods for offline to running measurements, you first have to gather measurement data, then analyse it and re-calculate in order to receive useful input for precision shaft alignment. When you are working with the Fixturlaser method you use the results of the OL2R measurement directly as an input in the horizontal Shaft alignment program.

Offline To Running Measurement with Fixturlaser OL2R and Fixturlaser Shaft - Step by Step

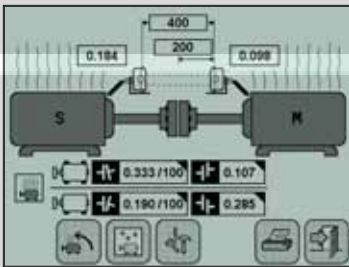
1.



Mounting of the OL2R fixtures

The two fixtures are mounted on both machines close to the rotating shaft. They are fastened by drilling, threading or by gluing on a small "kurts" (*picture to the left*). The OL2R fixtures are not stationary. They can be moved from machine to machine whenever needed.

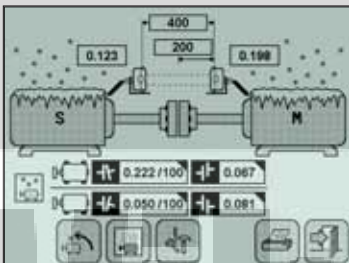
2.



Measurement in hot condition

First we need to find out how the fixtures are positioned in hot condition. We start by mounting the TD-units on the OL2R fixtures. When the machine is running, three measurements are taken at the 9, 3 and 12 o'clock position, rotating the OL2R fixture with the TD units. The result screen (*picture to the left*) shows how the OL2R fixtures are positioned to each other in hot condition.

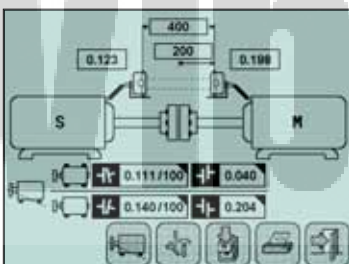
3.



Measurement in cold condition

Turn off the machine and remove the TD-units. The OL2R fixtures should not be removed or altered. Wait until the machine has cooled down. Mount the TD units on the OL2R fixtures. Perform the same measurement as in hot condition by rotating the fixture to 9, 3 and 12 o'clock. The result screen (*picture to the left*) shows how the OL2R fixtures are positioned to each other in cold condition.

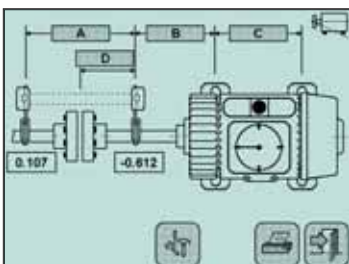
4.



Evaluation of the changes between the hot and cold condition

The result screen shows what has happened to the OL2R fixtures between the hot and the cold condition. The angular and the offset errors are displayed for the horizontal as well as for the vertical view (*picture to the left*). From here you can directly continue the precision shaft alignment process by importing the compensation values into the shaft alignment software.

5.



Performance of precision shaft alignment

To start the precision alignment, you move the TD units from the OL2R fixtures to the shaft and start to perform an ordinary shaft alignment. The compensation values from the OL2R measurement will be automatically inserted.

Fixturlaser offers off-line to running measurement available to everyone!

Offline to Running Measurement - Real Examples

The cost of alignment is typically very small when compared to the cost of the loss of production if a critical piece of equipment should fail. Even with the introduction of portable vibration monitoring equipment and easy to use laser alignment systems, alignment still ranks as one of the leading contributors to premature rotating machine failure and lost production. One of the reasons for this is the neglect or miscalculation of machinery dynamic movements. The three examples below shows that the actual dynamic movements of machinery need to be considered when aligning critical machines.

Example 1. Gas Turbines at a Co-Generation Facility

Serious vibrations and constant failures can be solved with an OL2R measurement

Two identical gas turbines, with sequential serial numbers and installed at the same time, adjacent to each other are performing the same duty, each running a 40 MW generator. Foundations, ducting and connections are identical.

However, serious vibrations lead to constant failures. The machines heat up in operation, so the OEM advised a vertical offset between generator and clutch of 1,01 mm for each machine to allow for thermal growth. However, actual measurements showed that the two "identical" machines did not grow identically as expected:

	Unit #7	Unit #8
Maximum vertical change	0,50 mm	0,76 mm
Steady state change	0,25 mm	0,55 mm

As you can see above, identical machines show a dramatical difference in dynamic movements. This has to be taken into consideration when aligning critical machines with high rpm. Going back to the tolerances for a 3600 rpm machine, a +/-0,05 mm recommended vertical offset misalignment, results in unit #7 is operating with a vertical offset of +0,20 mm and unit #8 is operating with a vertical offset of +0,46 mm. The test on both of these units required less than one day to complete with Fixturlaser Shaft and the OL2R fixtures.



Gas turbines at co-Generation facility

Example 2. Compressor at a Wastewater Plant

Both vertical and horizontal changes have to be taken into consideration

A 3600 rpm compressor at waste water treatment plant experienced severe vibrations. The machine had a long history of coupling and bearing failures. There had been attempts made to calculate the thermal growth. The manufacturer recommended vertical target of 1 mm at both feet, with no horizontal targets.

When the compressor was measured with Fixturlaser OL2R, it was found that the real OffLine to Running conditions were:

- vertical offset +0.56 mm
- vertical angularity: +0.88 mm/m
- horizontal offset: -0.04 mm
- horizontal angularity: -0.55 mm/m

OEM data never accounted for angularity or horizontal movement. The best way to obtain thermal growth information is to measure it directly.



Compressor at wastewater plant

Example 3. Fans at Production Site

"Identical" machines do not have identical dynamic movements

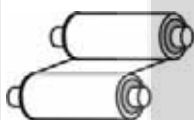
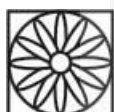
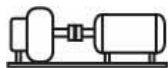
The two machines had identical design and even consecutive serial numbers. They were installed at the same time, next to each other, on identical foundations and were identically connected. The same thermal growth compensation was made.

These fans heat up in operation, so calculations were made to determine the running position since the fan housing and supports would grow as the units went on-line. What was found was that the two identical fans did not grow identically. There was almost a 0,5 mm difference in their on-line position. This points out the need to measure the actual position of the machinery.



The two fans did not grow identically.

FIXTURLASER®
OL2R



Our representatives are all engineers and technicians with special knowledge and training in the latest measurement and alignment techniques. An extensive service program is provided to support all our customers. It includes telephone assistance, hardware repairs, and software updates as well as training and consultancy regarding measurement applications.

straight to the point

The Fixturlaser OL2R Fixtures

- 1 robust aluminium case 780x300x140 mm
- 2 fixtures
- 1 thread tap
- 1 drill bit
- 1 manual

weight: Complete case 6 kg

Fixturlaser OL2R (mm)

art.no.1-0402

Fixturlaser OL2R (inch)

art.no.1-0403

Fixturlaser OL2R software

art.no.MV-0045

Use of the Fixturlaser OL2R fixtures

To be able to use the fixtures for offline-to-running measurement, alignment and documentation, the fixtures have to be accompanied with a Fixturlaser Shaft¹⁰⁰ or Shaft²⁰⁰ alignment system (see separate brochures).



Off-line to running measurement with the Fixturlaser Shaft TD-units mounted on the Fixturlaser OL2R fixtures. The measurement results are displayed on the large touch screen.



Fixturlaser Shaft, the laserbased alignment system for precision shaft alignment, is used together with the OL2R fixtures for off-line to running measurements.



The Fixturlaser OL2R Fixtures are delivered in a robust aluminum case.

When and where can the Fixturlaser OL2R be used?

Whenever and wherever you perform precision shaft alignment!

**FIXTUR
LASER**

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