PRÜFTECHNIK AG

TechNote #17 ROTALIGN®

The 'Sweep' measurement mode capitalizes on the patented 'Multi-point' functionality for greater accuracy and flexibility

Introduction

How do you measure machine alignment with the ROTALIGN laser alignment system?

1) The laser and sensor are clamped either side of the machine coupling.
2) The system is set to 'Measure' and the shaft rotated through at least a quarter turn.
3) During shaft rotation the sensor measures and records the slight variations in the position of the incident laser beam.

The accuracy of these measurements is of course paramount to the successful alignment of your machines. Which is why PRÜFTECHNIK has developed a unique measurement system for ROTALIGN to ensure you get the accuracies you need. Furthermore you benefit from absolute simplicity in use and the flexibility to handle all types of machines.

The 'Multi-point' principle

The PRÜFTECHNIK patented 'Multi-point' measurement system is the most advanced system available on the market. Here's why...

What could be simpler?

Measurement with ROTALIGN's 'Sweep' mode could not be simpler. Press 'START' and turn the shaft...

- from ANY start position
- in EITHER direction
- at ANY reasonable rate
- through ANY reasonable angle (ideally at least 75°)

During rotation the ROTALIGN sensor continuously and precisely monitors the shaft angle with dual inclinometers, and the laser beam incident on the dual detector array. And as if that wasn't enough to keep it busy it simultaneously takes a rapid series of 'snapshot' measurements from this flood of data!

When you have finished rotating the shaft press 'STOP' and the sensor sends all the measurements to the ROTALIGN computer for analysis.

... and it's the most accurate!

Superb resolution

The position of the incident laser beam is measured on the two detectors to a resolution of better than 1m (1/40,000"). The difference in position between the two detectors determines the beam angle to 10mRadians.

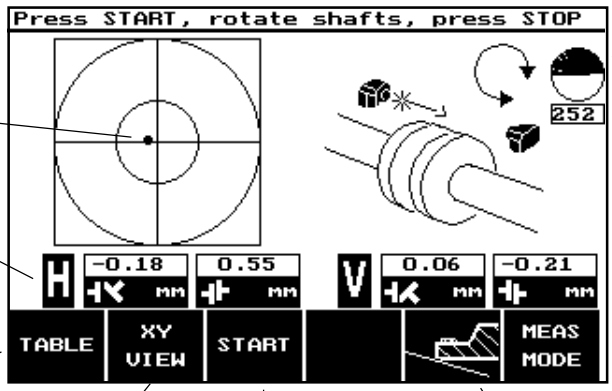
Blinding speed

A single measurement is made in less than 50 milliseconds ensuring that it is a true snapshot of the beam position. Throughput is up to 20 measurements per second depending on how fast the shaft is rotated.

Loads of data

Up to 128 measurements are made - leagues ahead of systems taking just three or four points. These values are all computed by a least-squares-fit algorithm to determine the beam trace to remarkable accuracy. And from this the coupling alignment is calculated and displayed.

ROTALIGN 'Sweep' mode on screen:



Extent of rotation shown together with number of points

This symbol appears if the measurements were not deemed sufficiend to yield a reliable result - Remeasure!

Position of laser beam on front detector

Instant display of coupling gap and offset as soon as sufficient measurements are made

Measurements are stored in a table for examination if wished

A range of other measure modes for specialist applications including entry of clock gauge values

View the position of the laser beam on the dual detectors

Press START to commence measurement, turn shaft and press STOP

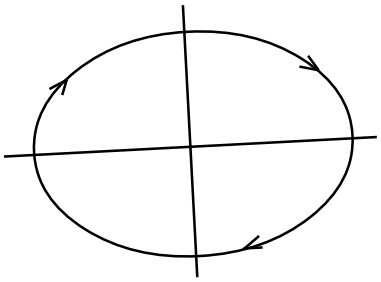
'Soft Foot' can be analysed at the press of a button

How many measurement points?

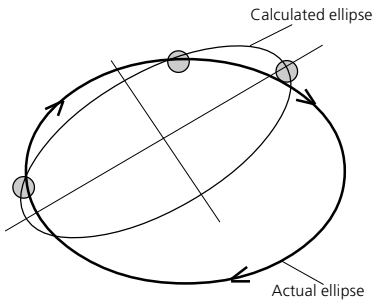
How many measurement points do you actually need to determine the coupling alignment? Mathematically, the answer is just three. i.e. with three points it is theoretically possible to calculate the coupling alignment (e.g. gap and offset).

But the more points you have, the more accurate the result. So why stop at three? ROTALIGN doesn't even *start* at three. ROTALIGN won't accept anything less than five points to give a result.

And that's just the start. The ROTALIGN sensor is continuously measuring as the shaft is rotated, in fact up to 20 measurements a second with up to 128 measurements in total. That's more than enough to ensure high accuracy.

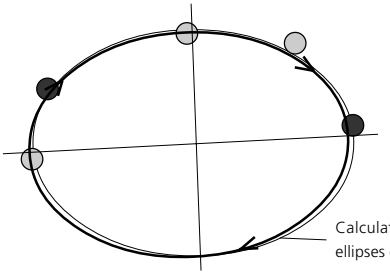


As the shaft is rotated the laser beam traces an approximately elliptical path. The shape of this path must be measured in order to calculate the coupling alignment.



The sensor measures the laser position at individual points shown here as gray dots, and mathematically calculates the shape of the complete ellipse.

With just three measurement points the ellipse MUST pass precisely through each point and is therefore entirely dependent on each point's accuracy.



With further measurement points (two more shown here) the shape of the ellipse is calculated from an average of the points and therefore is less dependent on the accuracy of each individual point.

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