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Laser Alignment Systems for Shafts, Turbines, and Machines





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Why you have to align shafts, turbines, and machines precisely!

Improved efficiency

Longer service life of all machine components

Improved quiet running with reduced vibrations

Decreasing energy consumption

Reduced temperatures at bearing, coupling, and lubrication

Reduced wear

Lower spare parts storage costs

Avoid flow problems in turbines

PRUFTECHNIK single-laser technology helps you achieve more!

ROTALIGN® touch

ROTALIGN® touch EX

OPTALIGN® touch

tab@lign®

PULLALIGN®

CENTRALIGN® Ultra RS5

GEO CENTER

Alignment and measurement of:

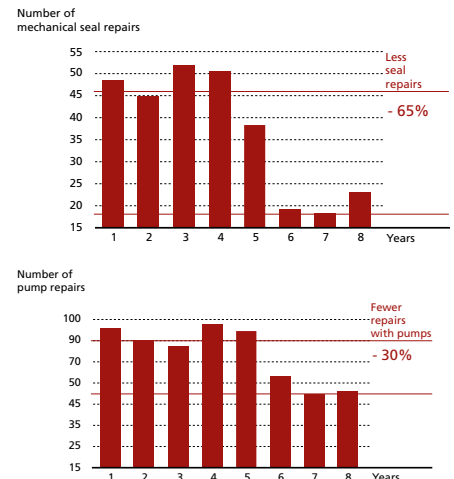
- ▶ Shafts
- ▶ Vertical machines
- ▶ Flanges
- ▶ Couplings
- ▶ Bores
- ▶ Turbines
- ▶ Joints
- ▶ Belt pulleys
- ▶ Machine foundations
- ▶ Cardan shafts

The advantages of machine alignment by the numbers

1. Fewer repairs

Repair work (e.g., on seals) can be reduced by up to 65 percent if the system is correctly aligned.

Repair work, (e.g., on pumps), can be reduced by up to 30 percent. If laser alignment is an integral part of the maintenance measures, all maintenance costs are reduced to a minimum because the acquisition costs for spare parts and their storage costs are reduced.



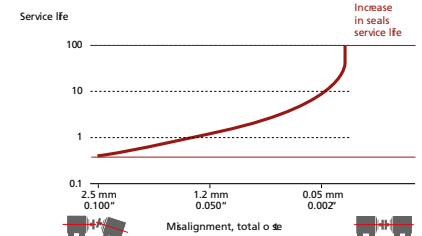
Source: ©HOECHST AG Gendorf/Germany

2. Longer machine running time

Precise laser alignment sustainably reduces mechanical wear on all rotating components.

If a machine is misaligned, this has a negative effect on the mechanical wear of bearings and couplings.

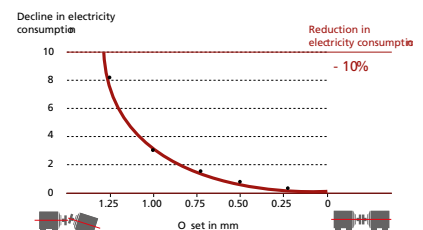
Due to the laser alignment and the reduced wear, the machine running time and efficiency are increased considerably.



Source: ©DURAMETALLIC Inc

3. Reduced energy consumption

Precise laser alignment saves energy that would otherwise be lost due to increased friction. Unnatural stresses in the machine are reduced. Energy consumption can thus be reduced by up to ten percent.



Source: ©ICI PLC

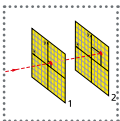
Alignment with PRUFTECHNIK...

At the beginning of the 1980s, PRUFTECHNIK laid the foundation for the worldwide evolution of machine alignment with a laser process for aligning machines. High-precision lasers and sensors have replaced the ruler and dial gauge and have since contributed to unprecedented alignment precision. Fast, simple, and intuitive application is always a top priority for PRUFTECHNIK. The numerous features of the laser sensor unit support the user in performing every single measurement safely, repeatably, and precisely!



Unibeam- Single Laser Technology

Unibeam technology uses only a single laser beam. All PRUFTECHNIK laser alignment systems are, therefore, quick and easy to install and guarantee maximum precision, even in the event of extreme angular misalignments.



sensALIGN®

The patented sensALIGN® sensor technology features a built-in inclinometer. This is based on the use of a microelectromechanical system (MEMS) that measures over a total of seven axes. The XXL HD PSD sensor forms the basis for this. With this superior sensALIGN® technology, our intelligent intelliSWEEP®, Simultaneous Live Move, and Quality Factor measuring modes, we achieve repeatable and precise measurement results in every area of misalignment.



intelliSWEEP®

With the intelligent intelliSWEEP® HD measuring mode, interference factors such as coupling play, angular misalignment, or external vibration sources can be easily found by the user and eliminated from the system in order to avoid poor data quality. As soon as the shaft rotates, a large amount of data is automatically and continuously recorded. The repeatability and the measuring precision are thus many times higher than with conventional measuring methods based on a three-point measurement.



intelliPASS®

With the intelligent intelliPASS® measuring mode, based on intelliSWEEP®, decoupled shafts can be measured and aligned to each other. For this purpose, the two measuring heads – sensor and laser – are rotated past each other in different angular positions. The measurements are taken automatically as soon as the laser beam hits the center of the sensor.



Quality Factor

The Quality Factor determines the data quality in real time and takes into account disturbing factors such as clutch and/or gear play and rotation speed. The inclusion of ambient vibrations in the calculation is unique and only available from PRUFTECHNIK. Measurement results with poor data quality are automatically deleted or can be manually removed by the user.

... fast, easy and precise!

Simultaneous Live Move

Simultaneous Live Move is a special feature that saves a lot of time during the alignment process. Horizontal and vertical corrections are monitored and displayed in real time. The Live Move can be started at any sensor position.



Move Simulator

The Move Simulator makes it possible to see how the machine will behave during alignment and whether the actual alignment will ultimately lead to the desired result even before the actual alignment with the prepared shims. This is a very helpful tool, especially when space is limited.



vertiSWEEP®

The intelligent vertiSWEEP® measuring mode, based on intelliSWEEP®, allows for the measurement of vertically mounted input shafts. This makes aligning vertical shafts just as easy as aligning horizontal shafts. Measurement occurs automatically through continuous rotation.



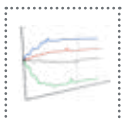
Cardan shaft alignment

The unique and patented measuring method enables cardan shaft alignment on site, without dismantling the shaft.



Live Trend

Live Trend is a function for monitoring and analyzing thermal or process control changes in the position of the machine during the start-up and shutdown phases. At the same time, Live Trend records the machine vibrations. The resulting set points or alignment presets can be used during shaft alignment in cold conditions to ensure optimum alignment of the machine in warm conditions.



Vibration Check

The sensALIGN® sensor measures the vibration velocity (ref) via the vibration test probe. The vibration measurement after alignment confirms the perfect alignment condition and ensures optimum operation.





Sets new standards!

ROALIGN® touch

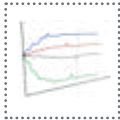
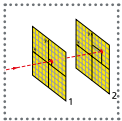
High-performance in perfection

Thanks to its unmatched sensALIGN® 7 laser sensor technology, ROTALIGN® touch is the measure of all things when it comes to aligning machines. This intelligent alignment system gets the job done, no matter where: on test benches with high rotational speeds, drives with long intermediate shafts, cardan shafts, and high-temperature systems. Troubleshoot:

- ▶ Alignment of coupled and uncoupled shafts
- ▶ Alignment of rotating axes, flanges, couplings, intermediate shafts, and cardan shafts (coupled/uncoupled)
- ▶ Measurement of thermal growth and machine movements during operation with Live Trend
- ▶ Alignment of vertical machines
- ▶ Move-simulator
- ▶ Alignment of up to six sequential couplings simultaneously
- ▶ WiFi, RFID, cloud transfer



The new dimension of laser alignment



OPTALIGN® touch

The game changer in laser alignment

The OPTALIGN® touch is the perfect device for everyday alignment and measuring tasks in the industry – an alignment system that no workshop or machinery should be without! Thanks to its unmatched sensALIGN® 5 laser sensor technology, all measurement results are extremely precise, are extremely precise, and can be repeated at any time.

- ▶ Industrial design: waterproof and dustproof (IP65), oil proof, dirt resistant, scratch-resistant, and impact-resistant
- ▶ Touchscreen display suitable for gloves
- ▶ Continuous recording of measured values during laser/sensor rotation (SWEEP MODE)
- ▶ Real-time display of the alignment process (Live Move)
- ▶ Wireless data communication (Bluetooth & WiFi)
- ▶ Fast, intuitive installation



ROTALIGN® touch EX

No. 1 in potentially explosive areas

ROTALIGN® touch EX reaches machines and systems in potentially explosive areas which are not accessible with normal devices and is ATEX / IECEx zone 1 certified!



- ▶ Industrial design: waterproof and dustproof (IP68), oil proof, dirt resistant, scratch-resistant, and impact-resistant
- ▶ Touchscreen display suitable for gloves
- ▶ Alignment of up to six consecutive shafts
- ▶ Alignment of vertical machines (vertiSWEEP)
- ▶ Alignment of uncoupled shafts and cardan shafts
- ▶ RFID detection and integrated camera
- ▶ Wireless data communication (Bluetooth & WiFi)



tab@lign®

Shaft alignment via Android app

tab@lign® is the perfect solution to quickly and easily check alignment conditions. The measurement data is recorded by the laser sensor unit via Bluetooth using a mobile app for tablet or smartphone.

- ▶ sensALIGN® 3 laser sensor technology for professional measurement results
- ▶ Live Move function – display of position changes in real time
- ▶ Available for Android and iOS



PULLALIGN® / PULLALIGN® Lite 2

Belt pulley alignment with laser precision

The easy-to-use PULLALIGN® laser alignment device allows belt pulleys to be aligned quickly and efficiently.

- ▶ Available with red or green laser
- ▶ High holding magnet force
- ▶ Easy to use
- ▶ Laser reflector for high precision
- ▶ Height-adjustable targets for quick application



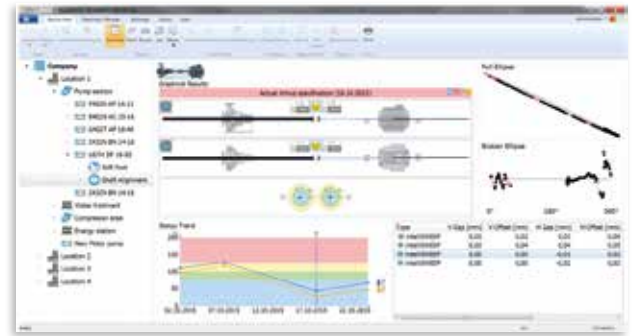
SHAFT ALIGNMENT

ARC® 4.0 alignment software

Planning and documenting alignment processes

The software is the ideal solution for the continuous storage of measurement data of a system and tracking the alignment condition profile in a graphical trend chart.

- ▶ Customizable templates for systems, couplings, tolerances, various measuring modes and reports
- ▶ The measuring mode for the bearing type is automatically suggested
- ▶ Compatible with devices of the ROTALIGN®, OPTALIGN® series
- ▶ Data import and export possible
- ▶ Saves and manages machine data
- ▶ Ideal for large, decentralized companies, maintenance teams, and service companies



GEO CENTER software

Multidimensional visualization of geometrical measurements

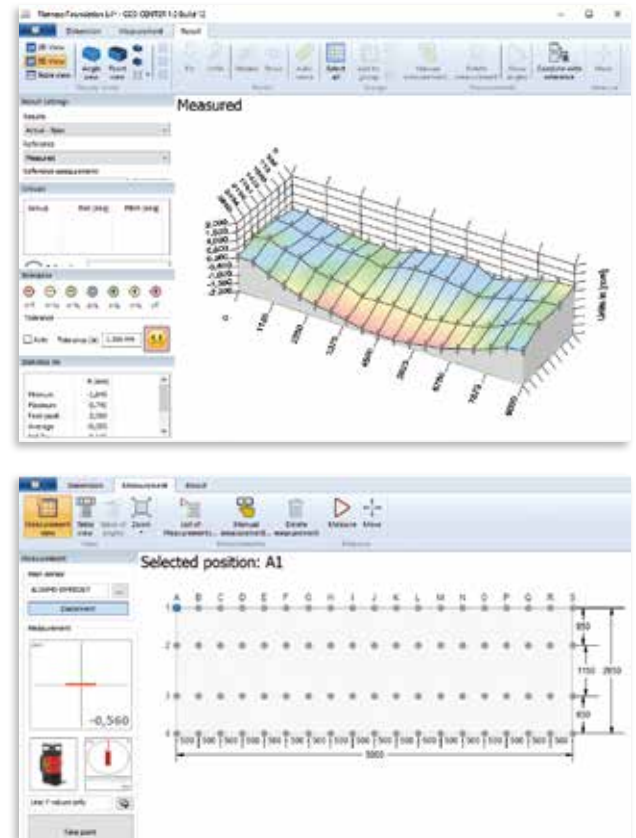
During the planning and design phase in a CAD program, all lines and levels of a machine or its foundation are 100 percent straight and flat. However, heat, cold, humidity and mechanical forces limit the material properties in reality. Geometric deviations of surfaces to each other, to once straight planned rails or even foundations, come about completely “naturally”. With the PRUFTECHNIK GEO CENTER software, these deviations from the ideals can be visualized clearly, quickly and easily. The measurement data from the PRUFTECHNIK laser measuring systems are transferred directly to a laptop/PC with the installed GEO CENTER software via Bluetooth.

The GEO CENTER software unites a multitude of geometric surveying possibilities:

- ▶ Straightness measurement (e.g., on rails, guides or bores)
- ▶ Flatness measurement (e.g., machine tables or foundations)
- ▶ Leveling (e.g., of machine halves)
- ▶ Plumbness (e.g., of vertical shafts or surfaces)
- ▶ Parallelism measurement (e.g., of rails or surfaces)

PRUFTECHNIK has the appropriate laser and sensor units for every special task. GEO CENTER allows individual measurement templates to be created and measurement levels to be defined independently and freely.

GEO CENTER uses a modern graphical user interface for quick and easy operation. The measurement results are displayed in colored 2D and 3D models. Deviations from the norm can thus be detected at a glance.



CENTRALIGN® Ultra RS5

Bore alignment and turbine measurement

When it comes to measuring bore holes (in internal combustion engines, compressors, pumps, gearboxes, stern tubes or steam/gas turbines, etc.), CENTRALIGN® Ultra RS5 is the superior system.

- ▶ Measure 120 mm to 4,000 mm diameters
- ▶ Control sensor for laser drift monitoring
- ▶ Highest precision from resolution in the micrometer range
- ▶ Faster and more accurate than any traditional method
- ▶ Maximum alignment distance of 50 meters (with long range laser)
- ▶ Compatible with Alignment Center software



GEOMETRICAL MEASUREMENT

sensALIGN® 7 sensor & laser

Measure parallelism, straightness, and perpendicularity

The sensALIGN® 7 sensor-laser unit is the most powerful PRUFTECHNIK alignment tool. Its unique dual-mirror technology on the inside outshines all other comparable systems, especially in extreme areas at maximum and minimum distances.

- ▶ 7-Axis measuring system
- ▶ Integrated MEMS inclinometer
- ▶ Geometrical measurement with GEO CENTER
- ▶ Bluetooth data communication



LEVALIGN® expert

High-powered laser for all geometrical measurements

LEVALIGN® expert is a precision high powered laser with a range of up to 100 meters without drift. It is the ideal system for all leveling, flatness, and straightness measurements.

- ▶ Self-leveling
- ▶ Control via remote app possible
- ▶ Measurement in horizontal and vertical direction
- ▶ Compatible with sensALIGN® 7 sensor
- ▶ Applications:
 - ▶ Measure hall floors
 - ▶ Measure bench foundations
 - ▶ Verify flatness/plane parallelism of large presses



LEVALIGN® Ultra iS

Precision laser for flatness and straightness measurement

LEVALIGN® Ultra iS is a high-precision flatness measurement system that uses a rotating laser.

- ▶ Measure flatness, leveling, and perpendicularity
- ▶ Range: approx. 20 m
- ▶ Applications
 - ▶ Machine foundations
 - ▶ Foundation plates and tables
 - ▶ Machine surfaces and housing halves
 - ▶ Round and rectangular flanges



INCLINEO®

High-performance inclinometer

INCLINEO® measures the flatness and parallelism of surfaces regardless of the angle of inclination. Likewise, the angularity and leveling can be checked.

- ▶ Measure relative and absolute inclination
- ▶ Calculate profile of machined surfaces and flanges
- ▶ Housing can be rotated by 360°
- ▶ Applications
 - ▶ Pressure cylinders of large presses
 - ▶ Measure the plumbness of vertical machines
 - ▶ Check the geometry of CNC machines



This is how shafts, machines, ...



... and turbines are aligned correctly



ACCESSORIES

Brackets

Essential accessories for every standard and special application

Perfect alignment results can only be achieved with the right laser/sensor mount – everything is possible.

- ▶ Brackets for standard and special applications:
 - ▶ For cardan shafts
 - ▶ For non-rotatable shafts
 - ▶ For extremely tight spaces



Shims

You just can't do without them

PRUFTECHNIK shims are available in many different thicknesses and sizes. They can be transported quickly, easily and comfortably from the workshop to the machine in a practical transport case.

- ▶ From 60x50 mm with 0.025 mm thickness (M12)
Max. 200x165 mm with 3 mm thickness (M52)
- ▶ Made of high-quality stainless steel
- ▶ Size information on each shim
- ▶ Deburred for injury-free use



PENTALIGN

Solution for complex measurement tasks

PENTALIGN is a high-precision rotating pentaprism. In conjunction with an external laser source, it generates a laser plane precisely perpendicular to the incident laser beam.

- ▶ Applications:
 - ▶ Determining the parallelism of surfaces (e.g., of tower segments on wind turbines)



EDDYTHERM®

Bearing heating via induction

PRUFTECHNIK not only supplies premium alignment systems for aligning machines and shafts, but also the right tools for mounting bearings on shafts.

In just a few minutes, the bearings are preheated by induction to such an extent that they expand and glide effortlessly onto the shaft. When the bearing cools down, it assumes its original size and guarantees the desired tight fit on the shaft and in the machine. Due to the induction heat, all tolerances and material properties are maintained without losses. No further work steps are necessary. EDDYTHERM® is a safe tool that only heats the workpiece, not the tool.

EDDYTHERM® is available in three different versions, depending on the size of the bearing or workpiece.

EDDYTHERM® portable:

- ▶ For workpieces from 20 mm inside diameter
- ▶ Max. 10 kg load
- ▶ Max. 180 °C induction heat



EDDYTHERM® 2x:

- ▶ Max. 80 kg load
- ▶ Max. 240°C induction heat
- ▶ Available options: 200- 575 V at 50/60 Hz



EDDYTHERM® 4x:

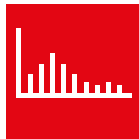
- ▶ For workpieces up to max. 300 kg
- ▶ Max. 250°C induction heat
- ▶ Automatic demagnetization
- ▶ Available options: 200- 600V at 50/60 Hz



PRUFTECHNIK stands for perfect solutions in maintenance. Worldwide!



Machine and shaft alignment



Machine and system monitoring



Non-destructive material testing

www.pruftechnik.com

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