

Fast, Easy and Precise Measurement, Alignment and Documentation with the Fixturlaser® Platform.

The Fixturlaser® Platform Offers Useful Values

⊕ Two Lasers - Twice the Value

The Fixturlaser® Shaft series utilize two lasers, one in each TD-unit. Except for the obvious technical advantages with this design, there is another major benefit for the user: **rough alignment**.

When measuring over large distances, it is often required to make a rough alignment before proceeding to precision alignment. Under these conditions, the two lasers are unbeatable. You begin by just visually registering where the laser beam from each unit hits. Then continue by rotating the units half a turn and measuring the distances between the two hitpoints. Half this value and you are home free! No matter how much misaligned the machines are, you can always make a rough alignment and then follow up with a precision alignment.

⊕ Long Lasting Investment

The Fixturlaser® Shaft series have components in common with other Fixturlaser® products. This makes it easy to expand your system to include functions for applications, such as roll parallelism measurement and advanced geometric measurement, without risking earlier investments in Fixturlaser® products. The display unit with its touch screen interface and standardized hardware components makes it easy to upgrade.

⊕ Measure - Align - Document

Fixturlaser® develops products as well as measurement methods. By learning our customers' processes, we know how to develop products that fulfill customer requirements not only on accuracy, but also on usability. An investment on the shelf is a bad investment. Fixturlaser® systems are as easy to use for measuring as for aligning machines. Realtime values are displayed during the alignment process guiding the operator towards a perfect precision alignment. The final measurement values can be documented by the supplied printer or transferred to PC software, the Fixturlaser® Documenter.

⊕ Multi-Lingual or Non-Lingual

Fixturlaser® products utilize a battery charged display unit with a touch screen interface. Together with our own software design, totally based upon symbols and graphic presentation, we provide easy to use equipment that requires a minimum of training. The absence of language specific terminology, totally free from text, makes it easy to use and minimizes the risk for errors.

⊕ Alignment and Measurement Service

Fixturlaser® has over the years earned a tremendous experience of alignment and measurements. Our alignment experts have been all over the world serving all kinds of industrial customers, using our alignment and measurement skills. This experience is the base for development of new products, but also a valuable resource for you as a customer to utilize.

After Sales Service around the World

Distribution and After Sales Service

Fixturlaser® markets and distributes products in more than 70 countries around the globe. Our distributors are experienced, skilled engineers and measurement technicians carefully selected and certified by our training institute.

One of Fixturlaser's strongest features is the after sales service. Owners of a Fixturlaser® system will always have access to assistance in operation and application support throughout our organization. Our certified service centers around the world perform maintenance and calibration of systems.

Fixturlaser® also offers all customers product and application training. During training, held by experienced application engineers, we go through all the three phases of alignment - measure, align and document. All practical training is performed on real rigs.

For more information, contact your local distributor or go to www.fixturlaser.com.



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Alignment & Positioning in the

SHIPBUILDING INDUSTRY

Fast, easy and precise alignment of gear boxes, motors, support bearings, jack-loads and foundations



One system
One method
One documentation
Numerous applications

The demand for large ships has increased during the last couple of years. The global trade has expanded and so has the need for sea bound transportation. The legislation regarding double hull is also a contributing factor. Even though the demand for large ships is increasing, the competition within the ship building industry is getting tougher. The steel prices are rising and new competitors appear. The industry is characterized by a demand for shorter lead times, increased efficiency and reliability, while at the same time the ship yards are being pressured to reduce costs and outage durations. To accomplish these goals, installations have to be performed even more efficiently.

The alignment and positioning of the machinery, in a fast, easy and precise manner, can play a crucial role in reducing time of installation, overhauls and also the cost. Fixturlaser's family of measurement products is uniquely suited to the needs of the shipbuilding industry.

We welcome you to explore what Fixturlaser® can do for your business!





TRENDS IN SHIPBUILDING CREATE A NEED FOR MORE EFFECTIVE ALIGNMENT

In order to give room for increased cargo volumes, the trend of having larger propulsion systems in decreasing space for machinery in ships continues. Larger propellers, increasing shaft diameters, shorter shaft lines and larger support bearings; they are all factors of a trend for more rigid design. This combined with today's capability to optimize the ship hull in terms of the steel structures, gives a more flexible design which increases the demand to make accurate and correct alignment of propulsion systems.

Problems with high vibration levels, high bearing loads and premature machine failures can be dramatically reduced by implementing the modern tools, methods and procedures for alignment. In addition, the continuous demands on reduced building time, give less room for errors and corrective actions at an early stage of the building phase.

Performing precision alignment at an early stage, can lead to dramatic reductions in time, when aligning the shaft line



Patrol and rescue boat building at shipyard in Norway

and obtaining approval for running conditions. "Well performed alignment of shaft lines significantly reduce the risk of premature machinery failures and gives the customer (ship owner) a higher degree of availability to his investment."

Less time available also increases the demands of reliable, easy-to-use alignment systems that can perform accurate measurements and be operated by several users. Less time also increases the demand on the alignment tool.

It has to be flexible and be able to be used in many of the alignment tasks that have to be performed during a propeller shaft installation.

As in all industry sectors, the demands of better documentation is required even for alignment. Methods and procedures have to be well defined and measurement protocols are required to obtain an approval for the installation. To follow the quality standards, the measurements must also be less operator dependent and traceable.

The Fixturlaser® laserbased alignment system can be used for a variety of measurement tasks within the ship building industry. You can find out more about different applications by reading the following pages in this brochure.



USER BENEFITS OF THE FIXTURLASER® LASERBASED ALIGNMENT SYSTEM

The Fixturlaser® laserbased alignment system can be used for a variety of measurement and alignment tasks within the ship building industry. With the Fixturlaser® laserbased alignment system, you can measure, align and document in a fast, easy and precise way.

FAST

- **Fixture kit that covers diameter ranges of 100-800 mm**
Requires minimum time for preparations.
- **Flexible equipment that can be used in many applications**
Don't require separate fixture or adapters that have to be custom made. Gives a quicker time to complete measurement.
- **No centring procedure of target/receiver is required (compared to bore scope)**
Reduces time for the measurement.
- **Laser beam (compared to tight wire)**
It's possible to break the beam without disrupting the measurement. Additional work can be performed.
- **Ability to move reference points**
Increases the evaluation capability. Quick and safer evaluation of results.
- **"Live mode" during adjustment/alignment**
Minimizes the time of re-measuring. Quick and safe adjustment.
- **Arc angle measurement function + R221 receiver**
Will not require definite measuring positions, which will reduce the time of measurement.

EASY

- **The system is equipped with illustrative graphics and a touch screen**
The system guides the user through the measurement step-by-step which makes the system userfriendly and easy to learn.
- **Same equipment for all measurements**
Less equipment. Less time for training and updating the knowledge. Higher degree of usage. Less pay-back time.
- **Equipment in rugged cases**
Equipment can easily be transported.
- **Visible reference (compared to optical method)**
Easy to rough align objects to a visible beam. Increased usage, since it can be used during the early stages of mounting equipment on the ship.
- **Rugged equipment (compared to PC or optical tooling)**
Sustains the working conditions onboard a ship.

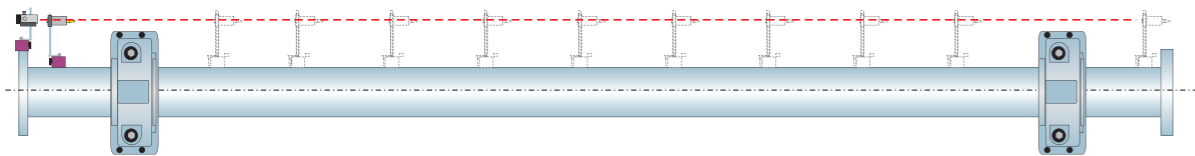
PRECISE

- **Filtering functions**
Compensation for environmental conditions to increase accuracy.
- **Memory function and documentation capabilities (compared to optical or tight wire methods)**
Reduced risk for human error, when recording and evaluating results.
- **Automatic recording of load and distance during jack-load measurements.**
Quick measurement. Decreased risk for human errors during recording phase. Less time required for measurement and verification of bearing load.
- **Memory manager and export function.**
Easy to transfer data to PC. Improves the documentation quality. Decreases time for establishing measuring reports. Possibility to have a uniform measuring protocol, which is not dependent on operator.
- **Graphic presentation of results**
Easier to evaluate results and reduces risks for misinterpretations.



STRAIGHTNESS OF PROPELLER SHAFT

Fixturlaser® laserbased alignment system can measure, align and document the straightness of a propeller shaft fast, easy and accurate.

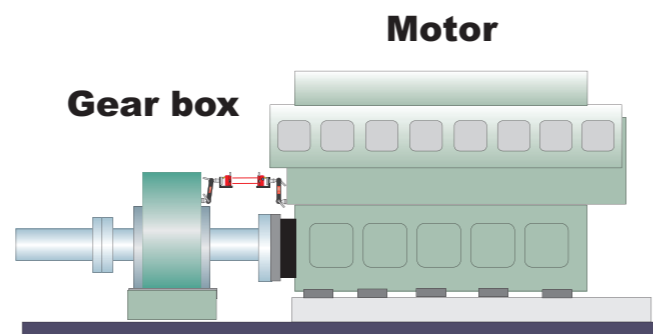


OFF-LINE TO RUNNING OR DYNAMIC MEASUREMENT

Machine alignment has to be performed, while the machine is shut off. Naturally, the machine is not in a working condition. However, when performing alignment, you have to consider the effects of running conditions, such as thermal growth. Manufacturer specifications often consider vertical growth due to rising temperature in the machine housing. Unfortunately, that is not enough to ensure an aligned machine in running mode. Two identical machines in identical installations do not behave identically from off-line to running. By measuring the machine positions, vertically and horizontally, in offline mode and in running mode, the correct compensation values are calculated.



Machines move and grow from offline to running conditions. The Fixturlaser® laserbased alignment systems have the capability to measure and calculate with these specific deviation values.

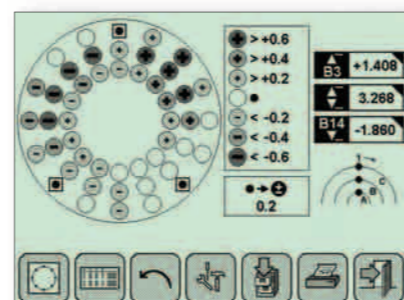


The Fixturlaser® OL2R fixtures are mounted on gear box and engine. Performing two measurements, one in off-line mode and one in running mode, will give you the correction values for a precision alignment. The machine will be perfectly aligned considering all forces and movements from off-line to running condition.

FLATNESS MEASUREMENTS

With the Fixturlaser® laserbased alignment system, flatness measurements can be performed of motor beds and foundations in order to prevent twists of engine and gear box housings. Today this task is performed using different types of levelling equipment. With Fixturlaser® laserbased alignment system, you can use the same tools as for many other measurements. The system gives you documentation and also assists with the adjustment by showing live values on the display screen.

Circular flatness measurement with Fixturlaser® laserbased alignment system can be performed fast, easy and precise. The illustrations shown on the display screen guide the user throughout the whole alignment process. Each measurement point can be registered and named individually.

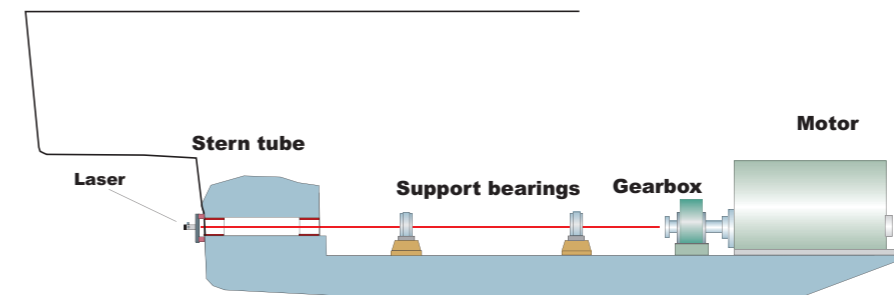


ALIGNMENT OF SUPPORT BEARINGS ROUGH ALIGNMENT OF GEAR BOX AND ENGINE

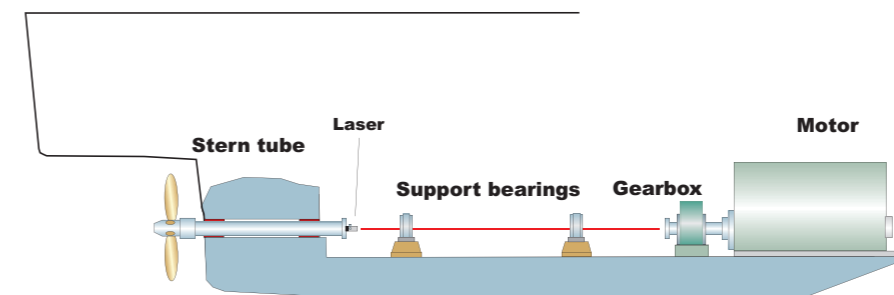
The alignment of support bearings, the gear box and the engine have to be performed prior to installation. Traditionally, these tasks have been performed using a wire or an optical measurement instrument. The usage of these tools have not been without problems. The usage of wire has caused problems with long distances and vibrations. Also the wire has been an obstacle, when performing other tasks simultaneously. When using an optical measurement instrument, there has to be two persons performing the alignment; one person is in control of the telescope, while the second person holds the target. The method is also dependent of the operator and does not include any measurement documentation.

Laserbased alignment with Fixturlaser®

Using the Fixturlaser® laserbased alignment system, you will be assisted by a visible red beam used as a reference. The rough alignment is easily performed and you are able to align against the live values shown on the display screen. The method is not operator dependent and documentation is included. The measurement involves only one person. Also other activities can be performed simultaneously without disturbing the measurement and alignment procedure.



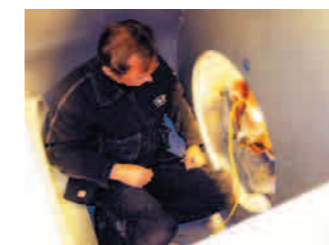
Alignment during construction using a laserbased alignment system from Fixturlaser®.



Alignment during repairs using a laserbased alignment system from Fixturlaser®.



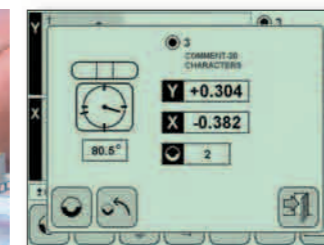
Alignment of engine with a Fixturlaser® laser-based alignment system.



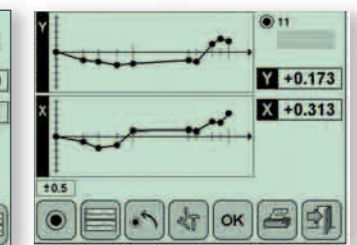
Measurement of bearing support prior to installation of the propeller shaft.



The stern tube is used as reference when measuring support bearings.



The measurement results are shown directly on the display screen. The result can then be transferred to the measurement data base.



ALIGNMENT OF SUPPORT BEARINGS, GAP AND SAG

Traditionally, the gap and sag measurement is performed by using feeler gauges. With the Fixturlaser® laserbased alignment system, you are assisted by live values shown on the display screen to align against. Documentation of the performed measurement and alignment procedure can be printed out directly or transferred to the measurement data base (see printer and receipt below).

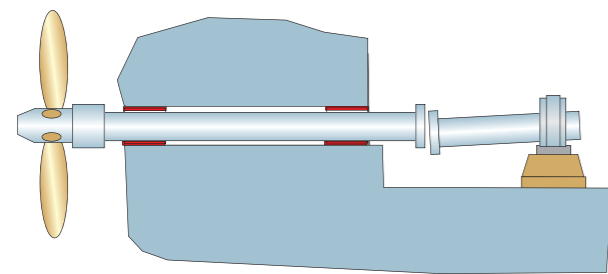
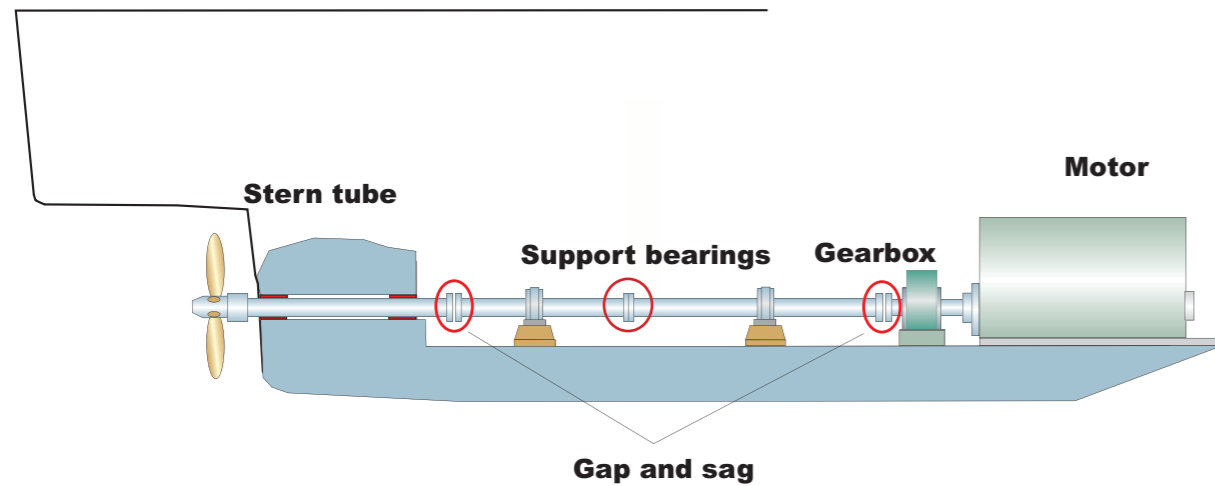
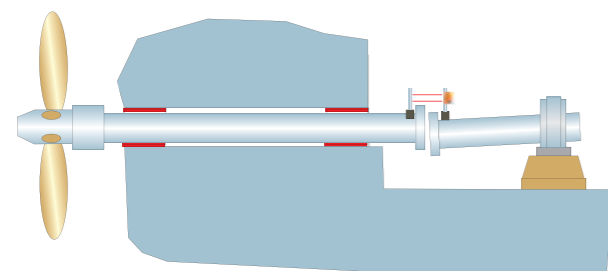
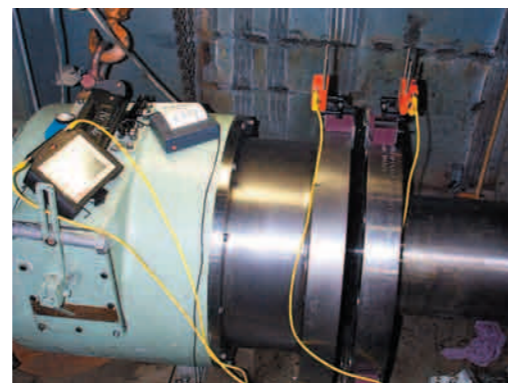


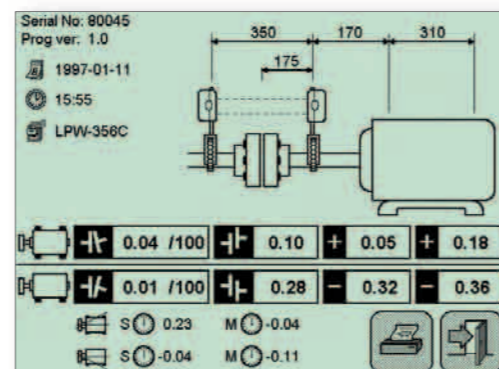
Illustration of the gap and sag.



Gap and sag measurement and alignment with the Fixturlaser® laserbased alignment system.



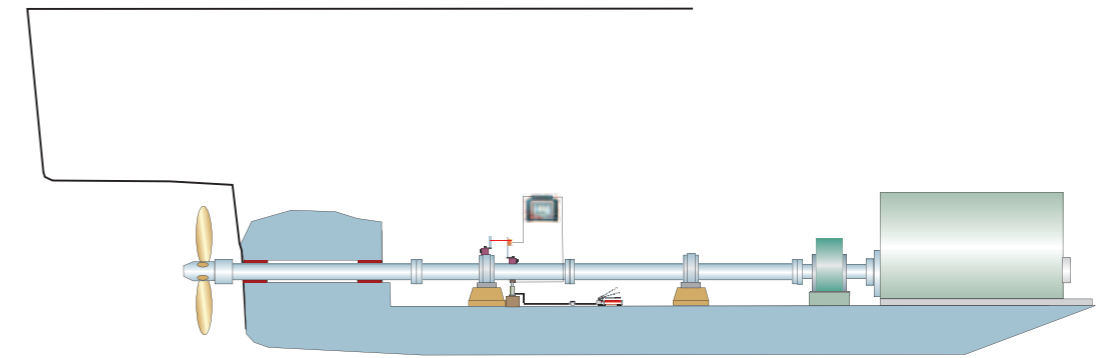
Alignment of diesel engine at a ship with the Fixturlaser® laserbased alignment system.



The printed out receipt shows the result of the alignment.

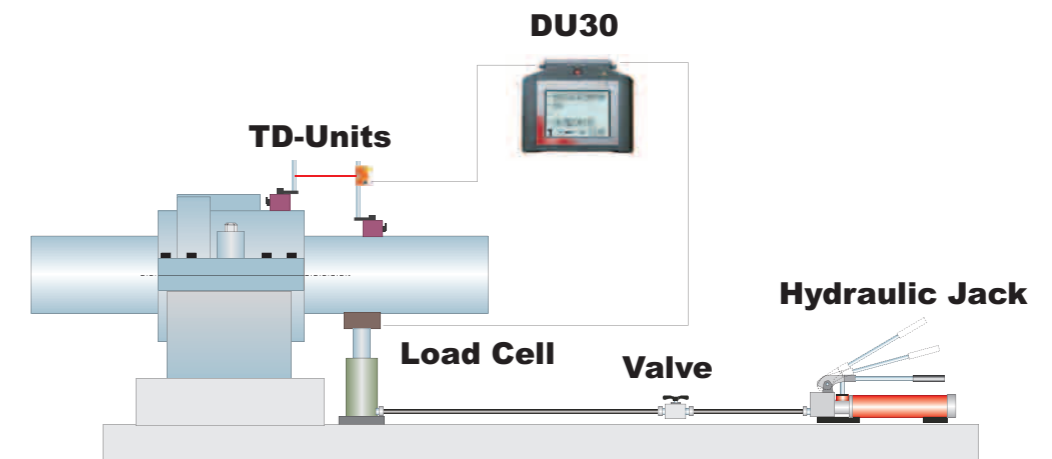
JACK-LOAD MEASUREMENT

When the ship is in the water, the verification of the bearing loads has to be performed. This procedure is critical and one of the last ones to be performed before the ship can be delivered. Usually, there is a shortage of time. Traditionally the jack-load measurement is performed with a hydraulic jack together with dial gauges and pressure sensors. There is no established method or tool used for this kind of measurement.



Laserbased alignment with Fixturlaser®

The Fixturlaser® laserbased alignment system, however, is developed to fit the specific needs of the shipbuilding industry with this customized system and method. The system makes things easier for the user, who does not have to use a combination of different tools. Just a single solution. Documentation that can be printed out directly and/or transferred to a PC, is also included in the system (see examples below).

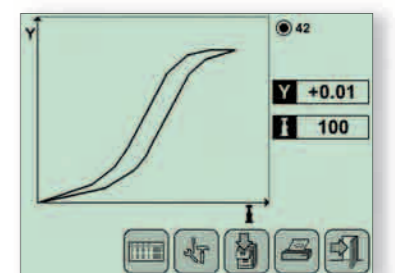


Automatic registration of the measurement values in the sequences decreases the operator dependability. The use of the Fixturlaser® laserbased alignment system results in an easy and standardized jack-load measurement and alignment.

Bearing no:	Drift	fed
Side of vessel:		mid
Sunshine on hull:		left
Jack force Unit:	Leight	Lpp
Piston diameter:	Propeller	submerged
Measurement taken by:	Department	Name
		Date

?

	Y	Y	Y		
1	+0.01	8200	8200	+0.01	42
2	+0.02	6400	6400	+0.02	41
3	+0.03	6600	6600	+0.03	40
4	+0.04	6800	6800	+0.04	39
5	+0.05	7000	7000	+0.05	38
6	+0.06	7200	7200	+0.06	37
7	+0.07	7400	7400	+0.07	36
8	+0.08	7600	7600	+0.08	35
9	+0.09	7800	7800	+0.09	34
10	+0.10	8000	8000	+0.10	33



The measurement result is displayed on the display screen and can be transferred to a measurement database. It can also be printed out directly.