

Alignment Application:

## Bearing race measurement following crankshaft bearing damage

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After the catastrophic failure of a reciprocating engine such as a marine diesel engine, the question is always whether the engine block bearing race was damaged and, if so, to what extent.

A quick decision is then required on the necessary scope of maintenance: Is the crank shaft bearing race damaged? If so, what repairs are necessary?

Whether or not the right measures were taken will become clear no later



Fig.1: Laser equipment for monitoring the bearing saddles

than the final check, in which the crankshaft deflection is measured. If the crankshaft does not run properly at this juncture, there will only be a limited scope of corrective measures that can be taken. And this can lead to considerable expense.

'Time is money' and 'only as much as is absolutely necessary' are mottos that illustrate the constraints under which the damage is identified and maintenance requirements are calculated.

A single day of ship laytime costs around 10,000 euros. Depending on the degree of damage, repair costs may result in additional expenses of up to 500%, which is why the damage should be identified as precisely as possible.

In addition to bearing race alignment, the roundness of the bearing seat should

be checked for deviations. This requires damage pattern measurements that provide information on the geometry of the bearing block: In what way is the bearing seat deformed? To what extent and where is the geometry out of round? This information is vital to determining the minimum amount of material to be removed if boring should become necessary later on.

With the BORALIGN® laser-optical measurement system and suitable accessories, a bearing race can be measured relatively quickly directly in the ship after the crankshaft is removed. New engine designs with hanging crankshafts are also easy to measure with this system, even in a half shell that is facing downward.

Only after information has been gained in this way is a reliable assessment of the necessary repairs feasible.

Unlike a complete set of drill pipes, which would fill a standard 12-foot container, BORALIGN® can be easily transported to the measuring location in two carrying cases. BORALIGN® achieves a reproducible level of accuracy that is impossible to achieve by conventional methods given a comparable time investment and scope of reporting. In addition, the enormous amount of effort that goes into taking measurements with drill pipes and dial gauges is hardly justifiable, especially when the findings are negative (no repairs necessary). If the BORALIGN® measurements result in positive findings that lead to the conclusion that additional work is necessary, the complete bearing race can be bored using mobile boring apparatus. The advantage is that the boring apparatus is not used unless it is actually required.

When boring, the shaft of the boring equipment must be aligned with the axis of the bearing race by means of additional adjustable auxiliary bearings- he steady rests. At best, only a single bearing block will have to be bored to install an oversized plain bearing. In contrast, even if only a single bearing block were to need correction, conventional methods would still require the entire bore



Fig.2: The laser sensor, which can be rotated inside the bore

shaft to be installed to be able to relate it to the reference axis.

Modern laser measurement equipment can work without an end-to-end bore shaft since the partial segments only need to be positioned on the reference axis in the required working area. Basically, the measurement values are taken at the relevant reference points and the bore shaft is aligned to the (laser-optical) reference axis. After a verification measurement, boring with a 'half bore shaft' will be faster and more cost effective.

This reduces maintenance and transport costs to a minimum. When maintenance work is completed and the final check shows that all measurement values are within tolerance, the measurement technicians and maintenance staff will be proud to have done 'only as much as was absolutely necessary'. ■



Fig.3: The laser transmitter with magnetic mounts