

DON'T FORGET ABOUT SHAFTING BENDING IN THE HORIZONTAL PLANE

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While aligning the ship propulsion shaftings, the focus, as a rule, is on the shaft alignment in the vertical plane. This subject is well discussed, but shaft alignment in the horizontal plane usually stays out of sight. Even the Rules of Classification Societies have no requirements on the alignment in the horizontal plane. It is believed that the subject is clear enough and the usage of optical or laser equipment solves all the problems.

It should be noted that shaft alignment in the horizontal plane is usually carried out in a dry dock or on a slipway when the Sun heats ship's hull from one side. Significant hull girder deflections induced by temperature bending of the hull girder arises. This is a well-known fact but sometimes shipbuilders forget about it when perform stern tube sighting and shaft alignment in the horizontal plane.

A ship repair company from Singapore invited us to check shaft alignment of both shaftings on a two screw ship. Several years before, the owner discovered very hard shaft contact with the side shell of intermediate portside and starboard bearings. The bearings had considerable wiping. After they had changed the bearing positions in order to improve the situation, other shafting issues appeared. That's why the ship owner finally decided to check the shaft alignment in the horizontal plane. In this connection IMT with our partner in Singapore conducted a study of shaft alignment parameters using the strain gauges technique. This method was selected because it allowed determining the shaft alignment parameters in both planes simultaneously. The measurements were processed using the ShaftDesigner software (<https://shaftdesigner.software/>) which offers the reverse shaft alignment calculations feature. A good agreement between the calculated and measured bending stress was obtained, Fig 1, 2.

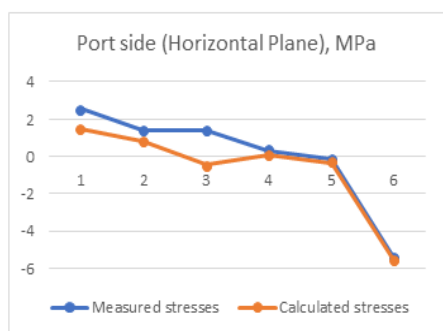


Fig. 1

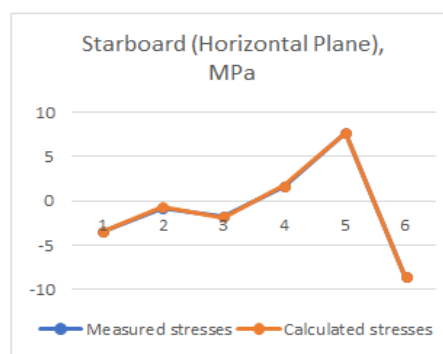


Fig. 2

Actual shafting deflections in the horizontal plane are shown in Fig. 3, 4. The shafting length is about 30 m. It is obvious that current bearing positions led to the bush wiping problem.

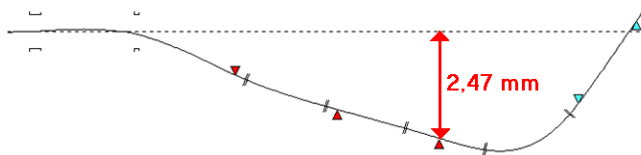


Fig.3 PS shafting deflections in the horizontal plane

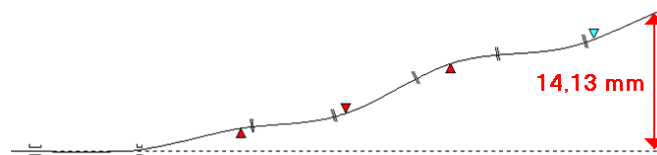


Fig.4 StB shafting deflections in the horizontal plane

Pay attention to the character of StB shafting deflections. The absolute values of the loads on the intermediate bearings are in the range of 10,0 ÷ 12,6 kN instead to be near zero. This overloading causes significant friction. Much more efforts had to be applied to turn the StB shafting during measurements than in the case of the PS shafting. In operation, such situation increases energy loss, fuel consumption. The customer got a recommendation to realign shaftings in the horizontal plane to avoid bearing damages in the future. Never forget about shafting bending in the horizontal plane.