ANALISIS KEKUATAN STRUKTUR *SIDE BOARD CORRUGATED* DENGAN *SIDE BOARD* PLAT DATAR KAPAL TONGKANG ENTRADA 3308, 330 *Feet*

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ABSTRACT

A barge is a type of marine transportation commonly used to carry bulk cargo, including coal. On barges with an open-deck construction, the side board functions as a cargo boundary and as a structural component that withstands lateral pressure from the cargo during loading and sailing operations. The side board structure must have adequate strength and stiffness to withstand the applied loads without experiencing excessive stress and deformation. This study aims to determine the load distribution on flat-plate side boards and corrugated side boards, compare the maximum stress and deformation values, and determine the more effective structural configuration based on the analysis results.

The method used in this study is the Finite Element Method (FEM) to analyze the structural strength of the side board. The study examines three configurations: a flat-plate side board, a corrugated side board, and a corrugated side board with the addition of one angle bar. All three models use KI-A36 material with the same loading conditions and boundary conditions. The applied load is lateral pressure caused by coal cargo with a magnitude of 0.050437 MPa. The analysis results are evaluated based on Equivalent (Von Mises) Stress and Total Deformation, and then compared with the BKI allowable stress of 263.89 MPa.

The results show that the flat-plate side board produces a maximum stress of 218.66 MPa and a maximum deformation of 7.85 mm, with a stress ratio of 83% relative to the BKI allowable stress. The corrugated side board produces a maximum stress of 231.94 MPa and a deformation of 9.52 mm, with a stress ratio of 88%, while the corrugated side board with the addition of one angle bar produces a maximum stress of 229.87 MPa and a deformation of 9.55 mm, with a stress ratio of 87%.

Based on the comparison of stress and deformation, the flat-plate side board is recommended as the best structural configuration under the loading conditions considered in this study. This recommendation is based on its lower maximum stress and deformation values compared with both corrugated side board configurations, as well as its stress ratio of 83% relative to the BKI allowable stress, which meets the criteria used in this study. Therefore, the flat-plate side board demonstrates better structural performance under the analyzed loading conditions.

Keywords: Barge, flat-plate side board, corrugated side board, Finite Element Method, Von Mises stress, deformation.