ANALISIS DAN INOVASI KONSTRUKSI HALUAN KMP PORTLINK III TERHADAP BEBAN TUBRUKAN MENGGUNAKAN METODE ELEMEN HINGGA

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ABSTRAK

Kecelakaan kapal akibat tubrukan dapat menyebabkan kerusakan serius pada konstruksi haluan karena merupakan bagian pertama yang menerima beban benturan. Penelitian ini bertujuan menganalisis respons konstruksi haluan KMP Portlink III terhadap beban tubrukan serta mengevaluasi efektivitas penambahan carling dalam meningkatkan kekuatan struktur. Pemodelan dilakukan menggunakan Autodesk Fusion, sedangkan analisis numerik menggunakan Autodesk Inventor dengan metode elemen hingga (*Finite Element Method/FEM*). Analisis dilakukan pada desain awal, carling horizontal, carling vertikal, dan carling kombinasi dengan variasi pembebanan 100%, 104%, 106%, 108%, dan 110% dari beban awal sebesar 1.191.900 N. Parameter yang dianalisis meliputi tegangan *Von mises* dan *safety factor*. Hasil penelitian menunjukkan bahwa peningkatan beban menyebabkan tegangan *Von mises* meningkat dan *safety factor* menurun. Penambahan carling mampu menurunkan tegangan maksimum dan meningkatkan *safety factor*, dengan carling kombinasi memberikan kinerja terbaik dalam meningkatkan ketahanan konstruksi haluan terhadap beban tubrukan.

Kata kunci: Beban tubrukan, *Finite Element Method*, *von mises stress*, *safety factor*, carling.

STRUCTURAL ANALYSIS AND REINFORCEMENT DESIGN OF THE BOW STRUCTURE OF KMP PORTLINK III UNDER COLLISION LOADING USING THE *FINITE ELEMENT METHOD*

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ABSTRACT

Ship collision accidents can cause severe damage to the bow structure because it is the first part of the vessel subjected to impact loads. This study aims to analyze the structural response of the bow of KMP Portlink III under collision loads and evaluate the effectiveness of adding carling*s to improve structural strength. The bow structure was modeled using Autodesk Fusion, while numerical analysis was conducted using Autodesk Inventor based on the Finite Element Method (FEM). Four design variations were analyzed under loading conditions of 100%, 104%, 106%, 108%, and 110% of the initial collision load of 1,191,900 N. The analyzed parameters were Von mises stress and safety factor. The results showed that increasing collision loads increased Von mises stress and reduced the safety factor. The combined* carling *design achieved the best structural performance by reducing maximum stress and improving the safety factor, thereby increasing the collision resistance of the bow*

Keywords: *collision load; Finite Element Method; Von mises stress; safety factor;* carling.