

# Abstract

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## **Ship Widening using Side Buoyancy Sponsons**

The modification of the ship structure is regarded as a conversion from alteration of the main dimensions (such as length, breadth, depth) to installing thrusters, generators, cranes, winches, similar. Increasing a vessel's breadth is performed by fitting sponsons (buoyancy boxes) to the ship's side. It may be carried out to reduce draught to increase deadweight. Stability is a very important aspect to clarify when planning a conversion, it is necessary to submit new intact and damage stability calculations demonstrating that the stability requirements and compliance is not less than before the conversion. Other performance parameters are also necessary to check after conversion. Examples include resistance, longitudinal as well as transverse strength. A case study was undertaken in which the stability of 130 m Ro- Ro ship which has gone a conversion increasing her width 2 meters by adding a buoyancy boxes (sponsons) at her sides extending by 10.13 % of her breadth with particular emphasis on their effects on ship stability characteristics. Computer models are carried out for the vessel before and after hull modification to assess the vessel overall performance due to such conversion. A number of aspects are considered for the vessel, such as hydrostatic particulars, intact stability, longitudinal and transverse strength calculations as well as ship resistance. The obtained results indicated that a number of hydrostatic particulars showed significant changes, while other kept at their values due to sponsons fitting. Regarding intact stability after conversion, maximum V.C.G. for the ship with sponsons (which combines all stability criteria requirements) improved by 12% compared to the vessel's condition before sponsons fittings. Maximum allowable section modulus that the vessel can withstand was assessed and compared to its value before conversion. Finally, the effect of sponsons on the total ship resistance at design speed was addressed and results discussed.