

## **DRAUGHT SURVEY: HULL DEFLEXION – SELECT THE CORRECT TOOL**

Bulk carrier vessels are confronted with Draft Survey calculations, at least prior to and after cargo operation (established on the contract of carriage). It is well known that on the States where the Carriage Conventions had been ratified, the reservations incorporated in the Bills of Lading can support the sea carriers' exemptions to liability in case a shortage claim is presented upon completion of sea venture. However, some jurisdictions do not accept the reservations incorporated in the Bs/L and sometimes significant shortage claim are faced by Owners and their P&I Clubs.

The Shipping Industry accompanied during previous years a warm and valid debate regarding the accuracy of Draught Survey and Shore Scales. Both methods of measurement are based on science and shall be well considered.

The problems for the sea carriers commence when both methods are alternately applied to determine the quantity loaded and discharged (one at loading port and the other at discharging port).

The quantity of cargo loaded on board is measured by Draft Survey and/or Shore Scale. Terminals handling abrasive bulk cargoes usually select the Draft Survey calculations, and shipment of non-abrasive cargoes are usually determined by Shore Scale.

Certainly, the results of a well conducted Draft Survey calculation at loading port shall be confirmed at discharging port, even if measurement is carried out by other method (shore scale).

However, to achieve a `Well conducted Draft Survey`, familiarization with nautical education, development of naval architecture, and comprehension and proper processing of various data collected during survey are necessary; for example: the correction of hull deflexion (hogging or sagging) is an issue misinterpreted by ship`s officers and surveyors, which is consequently responsible for inconsistent Draft Survey figure.

It is not abnormal during the initial Draft Survey calculation to observe hogging effect in the ship`s hull, and opposite deflexion (sagging) during final calculation. Hogging condition decreases the ship`s lightweight constant and sagging condition increases the final net displacement. Needless to mention that the conjunction of both effects is detrimental for sea carriers once an imprecise quantity of cargo loaded is ascertained. If hull deflexion is not properly treated (selective use of hull deflexion correction), quite surely the vessel shall face a significant shortage claim if a different method of measurement (shore scale) is used at discharging port.



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Historically, the usual correction of hull deflexion was based on the Block Coefficient ( $C_b$ ), assuming a well-formed curve (deflexion). Unfortunately, such effect is not always replicated in large vessels; and on hull deflexion exceeding 9/10cm (hogging) and 3/4cm (sagging) the correction of hull deflexion, based on the  $C_b$ , appears to be insufficient.

Without proper understanding of hull deflexion effect (more than 9/10cm on hogging condition) during initial Draft Survey calculation, a reduction of ship's historic lightweight constant is ascertained; and unnecessary disagreements over sea water density, draught readings, ballast water sounding or density are verified.

If hull deflexions, mentioned above, are verified, it is recommendable to replace the correction of hull deflexion, based on the  $C_b$ , to the Waterplane-Area Coefficient ( $C_{WL}$ ) method, or Simpson's First Rule (1-4-1). The results achieved by this method increase and decrease, respectively, the initial and final Net Displacement, resulting in a very consistent figure upon comparison with a well calibrated shore scale equipment.

Some P&I Clubs already published circulars emphasizing the different methods of Hull Deflexion Correction; however, in order to have a better comprehension of both methods, it is suggestable to the Owners / Technical Managers to recommend the Deck Officers the familiarization with the guidelines contained on the book "Draught Surveys – A Guide to Good Practice – Second Edition", including UN ECE – Code of Uniform Standards and Procedures for the Performance of Draught Surveys of Coal Cargoes (The Code and its forms can be freely downloaded from the [UN ECE website](https://www.unece.org/fileadmin/DAM/energy/se/pdfs/ece_energy_19e.pdf) at [https://www.unece.org/fileadmin/DAM/energy/se/pdfs/ece\\_energy\\_19e.pdf](https://www.unece.org/fileadmin/DAM/energy/se/pdfs/ece_energy_19e.pdf))

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