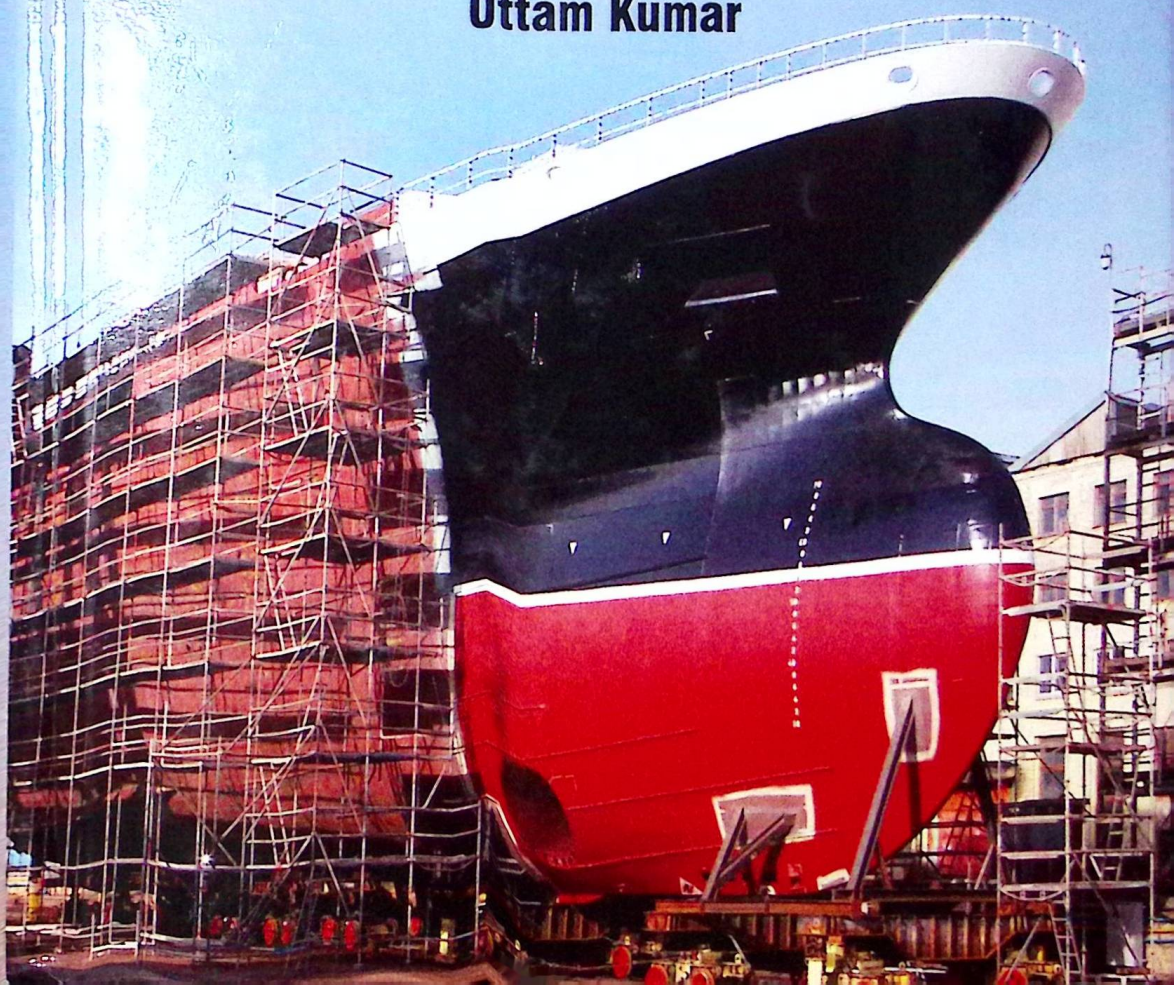
SHIP BOTTOM STRUCTURE AND CONSTRUCTION ENGINEERING

Uttam Kumar



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RANDOM

RANDOM PUBLICATIONS LLP
NEW DELHI (INDIA)

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1

Introduction

One of the most integral parts of the ship is its bottom structure. It is designed not only to give the hull the required strength to withstand the weight of the cargo but also to withstand the external hydrostatic loads that act on the bottom of the hull.

A ship's hull is basically made up of bent plates welded together. If these plates are not stiffened, the bending moments on the plates due to the loads may exceed the value of stress that can be withstood by the material, and hence cause failure. So, the plates are stiffened (or their section modulus is increased) by adding stiffeners to them.

Now, there are two basic ways to stiffen a ship:

1. Transverse Stiffening
2. Longitudinal Stiffening

Transverse Stiffening or Transverse Framing: This is carried out in ships less than 120 meters in length. In transverse stiffening, the stiffeners run along with the breadth of the ship. We would be discussing this with interesting details a little later.

Longitudinal Stiffening or Longitudinal Framing: This type of framing employs stiffeners that run longitudinally, that is along the length of the ship, and is used in all seagoing ships having a length more than 120 meters.

Now that we have an idea of the two types of framing, we need to acquaint ourselves with another categorisation of bottom structure framing in ships:

SINGLE BOTTOM

Usually, all smaller ships are single bottomed, as they do not need a double bottom to withstand the load of the cargo. In these ships, the plate floors (see the figure to understand the context of 'Floors' in shipbuilding) themselves act as the stiffening members of the bottom shell plating. Plate floors (as shown in the figures) constitute transversely running plates at every frame spacing.

Note how the upper edge of each plate is flanged to increase the bending strength of the plate floor. Now, fall back to the basics for a while.

When the hydrostatic pressure under the bottom shell exerts a bending moment in the bottom shell, the plate floor takes up the bending stress.

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