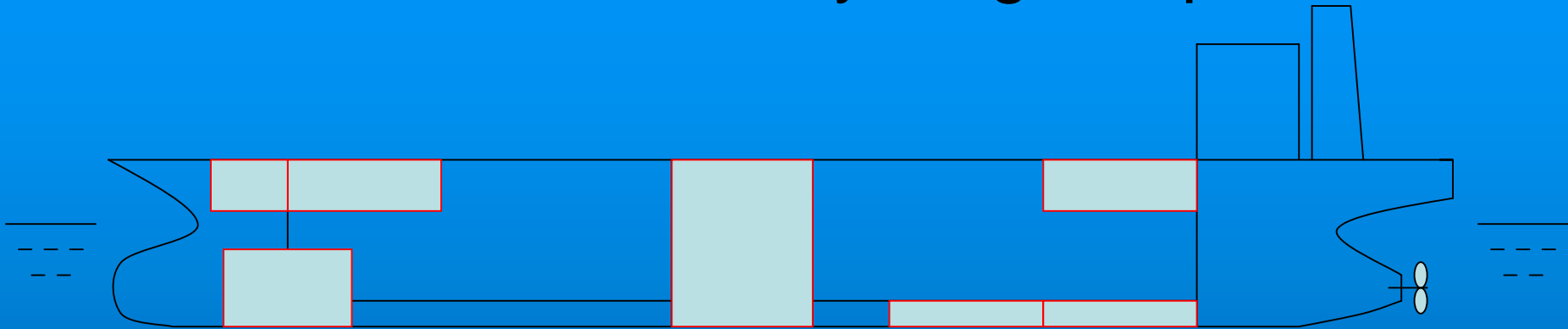
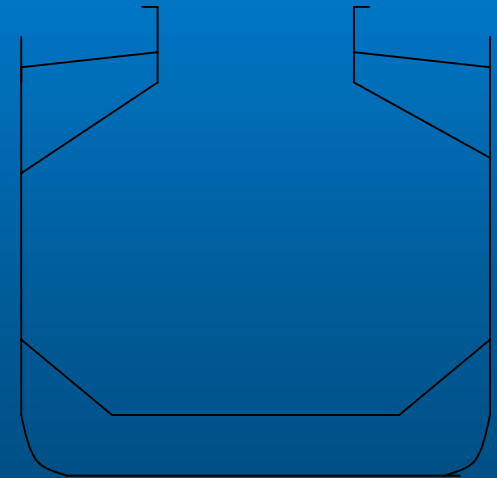


# Critical areas of structural concerns on bulk carriers / dry cargo ships



1. Global longitudinal strength
2. Local strength
3. Flooding Risk
4. Risk to cargo concerns



# 1. Global longitudinal strength

## ➤ Primary members / areas:

- 1) Strength deck plating ( main deck plating outline of hatch opening).
- 2) Sheer strake
- 3) Bilge turn area ( to be inspected in dry dock or via underwater camera)

## ➤ Ultrasonic thickness measurement:

- 1) 3 belts with one near midship area, which indicates the thickness condition of all longitudinal members usually as elements for calculation of the bending module.

## ➤ Loading / unloading sequence:

- 1) Improper loading or unloading will cause significant local stress which has resulted in several capesized bulkers being damaged whilst in port; the loading / unloading sequence should be checked.

## 2. Local strength

### ➤ Hotspots / fatigue points

- 1) Wind / water strake shell plating at fwd water ballast tanks always impacting by sea water during heading.
- 2) Hatch corner deck plating and hatch coaming where potential cracks / buckling caused during hull girder twisting / hogging / sagging
- 3) Corners of water ballast tanks surrounding the ballast hold(s), where local stress usually is higher during deep ballasting
- 4) Any other discontinuous points in the longitudinal direction, such as the connecting welds of hopper / sloping plating to fwd-end transverse bulkhead (the collision bulkhead) and to aft-end transverse bulkhead ( ER fwd bulkhead), and ends of longitudinal hatch coaming stays

### ➤ Surrounding boundaries

of water ballast tanks adjacent to heated spaces such as a heated fuel tank or machinery spaces with higher temperature;

### ➤ Mechanical damages – shell damage by tugs; hold damage by crabs; contact damage of shell at fwd area etc.

# 3. Flooding Risk

- **Critical areas with invading sea water:**
  - 1) Forecastle spaces & FPT
  - 2) Hold No.1 & 2
  - 3) Any other compartments with opening(s) before collision bulkhead. (special attention on ductkeel pipe tunnel, easily missed out by Class)
- **IACS URS 26** — small access hatches to forecastle spaces on forecastle deck (or fwd main deck);
- **IACS URS 27** — air vent pipes on forecastle or fwd main deck
- **IACS URS 30** — hatch cover stoppers at fwd hatches within 0.25L of the fore perpendicular, usually hatch No.1 & 2
- **IACS URS31** — condition of shell plating with frames in all holds which should be capable to stand for the stress from loaded cargoes & sea
- **IACS URS 19,21&22** — condition of double bottom tank in hold no.1, tank top plating in hold no.1 and separation bulkhead between hold no.1 & 2 for bulk carriers loading with cargoes of density more than 1.78t/m<sup>3</sup>.

# 4. Risk to cargo concerns

## ➤ Hatch covers

## ➤ Pipes passing in holds

- 1) Air vent pipes from double bottom water ballast tank – by hydro testing
- 2) Air vent pipes from double bottom fuel tank – by visual close up inspection
- 3) Sounding pipes
- 4) Other pipes leading to the hold – CO2 pipes, conduit pipes, etc.

## ➤ Surrounding boundaries

- 1) Tanktop plating (inner bottom plating) with manhole covers
- 2) Hopper plating
- 3) Sloping bottom plating
- 4) Hatch coaming plating
- 5) Collision bulkhead

## ➤ Bilge wells