

Seven Ships That Teach Stability

Six of them lost the argument with their own righting arm. One of them never had a stability problem at all — and that is the one that pivots the lecture to construction.

VESSEL	YEAR	WHAT ACTUALLY KILLED HER	THE CONCEPT
Vasa	1628	Too much weight too high; test ignored	KG and GM
SS Eastland	1915	Lifeboats added aloft after Titanic	KG raised by 'safety'
Herald of Free Enterprise	1987	Bow doors open, water on the car deck	Free surface effect
SS Normandie	1942	Firefighting water high in the ship	Free surface at rest
Golden Ray	2019	Wrong ballast figures in the calc	GM you never had
Fishing vessels (icing)	any	Freezing spray building topside	The quiet KG creep
Liberty ship Schenectady	1943	Brittle fracture, no sea, no heel	CONSTRUCTION

The Vasa

STOCKHOLM · 1628 · SANK ON HER MAIDEN VOYAGE

Sweden's flagship, built tall and narrow with two gun decks crammed high and nowhere near enough ballast down low. KG way up, GM essentially gone. Before she sailed they actually ran a stability test — thirty men running side to side across the deck. She heeled so hard that after three passes the admiral stopped it. And then they sailed her anyway. She made about thirteen hundred metres, caught a gust, heeled, downflooded through her open gunports and sank in her own harbour.

THE LESSON · High KG kills you — but note that the test *worked*. It told them exactly what was wrong. Heeding the test matters more than running it.

SS Eastland

CHICAGO RIVER · 1915 · CAPSIZED AT THE DOCK

A top-heavy Great Lakes excursion boat. After the Titanic disaster she was fitted with *more lifeboats* — mounted high, raising KG further. Loaded with passengers for a works picnic, she rolled onto her side while still tied to the wharf, in about twenty feet of water. Around 844 died — more than the Lusitania.

THE LESSON · Safety equipment added up high can be the thing that kills you. And a vessel does not need weather, or way on, or even to leave the pier, in order to capsize.

Herald of Free Enterprise

ZEEBRUGGE • 1987 • CAPSIZED IN UNDER TWO MINUTES

The ro-ro ferry left the berth with her bow doors still open. Water came onto a big, undivided car deck — and a wide shallow layer of water is a stability wrecking ball. The virtual rise in G took her over almost immediately, just outside the harbour. 193 people died.

THE LESSON • Free surface. If you want students to *feel* the effect rather than compute it, this is the one — it was inches of water across a wide deck, not a flooded hold.

SS Normandie

PIER 88, NEW YORK • 1942 • ROLLED OVER AT HER BERTH

The great liner caught fire during her wartime conversion. Fireboats poured thousands of tons of water into her upper decks. All of it high in the ship, all of it with a free surface. She took an increasing list through the night and slowly rolled over against the pier.

THE LESSON • Firefighting water is a stability hazard. Pump it in high and you can lose the ship you are trying to save — free surface does not care that you are alongside.

Golden Ray

ST. SIMONS SOUND, GEORGIA • 2019 • CAPSIZED IN THE CHANNEL

A pure car and truck carrier, capsized shortly after leaving Brunswick. Not weather — numbers. The NTSB found that incorrect ballast quantities had been entered into the stability calculation, so she sailed with far less GM than anyone believed. On a routine turn in the channel she heeled and simply did not have the righting energy to come back, and open watertight doors turned a knockdown into a full capsize. All twenty-four crew were rescued, some cut out of the hull. She was later cut into eight sections and removed in place.

THE LESSON • Her righting arm was gone before she ever left the dock, and nobody aboard felt a thing. The villain in this one is a spreadsheet.

Topside icing — the fishing fleet

HIGH LATITUDES • EVERY WINTER • STILL HAPPENING

Freezing spray builds on rigging, rails, aerials and superstructure. It goes on where it hurts most, it goes on evenly enough that nobody notices, and it can add many tons before anyone calls it a problem. A boat that was perfectly stable at the dock develops a loll and then goes over. It has killed more crab and cod boats than weather has directly.

THE LESSON • The quiet KG creep. Every hazard on this sheet is invisible until it is decisive — this is the one where the crew can literally watch it happening and still not see it.

Liberty ship Schenectady — the pivot to construction

PORTLAND, OREGON · 1943 · BROKE HER BACK AT THE FITTING-OUT DOCK

Brand new, sitting quietly in cold water, no cargo drama and no sea running. She cracked almost in two with a report heard for a mile. Brittle fracture: an all-welded hull rather than riveted, so a crack had nothing to stop it; steel with poor notch toughness at low temperature; and stress concentrations at square hatch corners.

THE LESSON · Calm water, no waves, no stability problem whatsoever — the *material* failed. This is why hatch corners are radiused, why we care about notch toughness in cold service, and why welding changed how a hull has to be designed, not just built.

A closing line, if you want one: every casualty on this sheet was a margin that had already been spent before anyone noticed. A good mate spends the whole watch managing the thing nobody can see until it is too late.