Was the Titanic a big ship and is it an appropriate benchmark?

Paul Stott, 16th September 2013

In reporting the heroic efforts of salvors to extract the stricken cruise ship ‘Costa Concordia’ from the rocks off the island of Giglio, the BBC reported (Today Programme, 16th September 2013) that the ship “weighs twice as much as the Titanic”. In making this statement the BBC are perpetuating a very common mistake found even in the technical press when discussing the concept of ‘tonnage’ in the context of a merchant ship.

What is normally quoted as the ‘tonnage’ of a merchant ship is, in fact, a measure of volume, not weight, and the correct unit is ‘tons’, not ‘tonnes’. The confusion arises because tonnage was originally ‘tunnage’ and referred to the number of ‘tuns’ or barrels that a ship could carry. One ton was originally 100 cubic feet but is now decimalised at 2.73 m³ and refers to the volume enclosed by the ship and its superstructures (with various allowances that we don’t need to go into). It is fundamentally, therefore, a measure of the physical size of a ship in terms of its enclosed volume.

Using tonnage correctly the Titanic was registered at 46,328 tons, compared to the Costa Concordia’s 114,147 tons. The Costa Concordia in terms of its physical size was therefore about 2.5 times the size of the Titanic and the BBC’s statement is therefore correct on this basis. On the basis of weight, however, the two ships were remarkably similar.

The weight of a ship in service is made up of two elements: the ‘lightship’ weight, being the physical weight of the ship and the ‘deadweight’, being the weight of everything aboard the ship such as fuel, stores and cargo. The sum of the two is the ‘displacement’ which is the weight of the ship and everything in it (by simple Archimedes, the weight of a floating body is equal to the weight of fluid displaced). Displacement is used routinely only to specify the size of warships: for example the US Nimitz class carriers, the largest warships ever built, have a displacement of 100,000 tonnes – meaning that the ship actually weighs 100,000 tonnes when loaded. How much the ship itself weighs without deadweight is not a matter of public record. For merchant ships the displacement and ship’s weight are rarely used except for specific technical purposes, and the values are rarely quoted in technical particulars.

The Titanic’s displacement was 52,310 tonnes at full load, compared to around 55,000 tonnes (my estimate) for the Costa Concordia, so when in service the ships weighed remarkably similar amounts – primarily because the steel of the Titanic will have been much thicker than the Costa Concordia and that coal is a relatively heavy fuel. The actual weight of the ships themselves (the ‘lightweight’) was 38,760 tonnes for the Titanic and around 46,000 tonnes (again, my estimate) for the Costa Concordia, so the Costa is about 20% heavier than the Titanic.

Back to the original question, was the Titanic a large ship? To answer this we have to refer to Gross Tonnage, the physical size of the ship, not its weight. In the modern era it has to be said that she was relatively no more than medium-sized. When built in 2006 the Costa Concordia was a large cruise ship at 114,000 tons, but the largest at that time was the Queen Mary 2, delivered from Chantiers de L’Atlantique in St Nazaire in 2003, at 148,528 tons – with a lightship weight of 60,637 tonnes or 1.6 Titans, if this is of interest. But even this has now been well surpassed, with the largest cruise ship currently being Royal Caribbean’s ‘Oasis of the Seas’, delivered from Finland in
2009, which is a colossal 222,282 tons, nearly double the size of the Costa Concordia and nearly five times the size of the Titanic. The lightweight of the Oasis is by my estimate about three times that of the Titanic, so it would be correct to say that it ‘weighs’ as much as three Titanics, but is physically five times larger.

Even this is not the largest ship ever built, however. To identify that we have to use deadweight, because that is the measure normally used to state the size of a ship carrying relatively dense bulk cargoes. The accolade goes to an oil tanker that was part of a series of ships referred to as ‘Ultra Large Crude Carriers’ or ULCCs built in the 1970s. The largest ever was the appropriately named ‘Seawise Giant’, delivered from Sumitomo in Japan in 1979. That ship was 564,763 tonnes, referring to the deadweight tonnage and indicating that it was capable of transporting over half a million tonnes of crude oil. ‘Seawise Giant’ is also the longest ship ever built, at nearly 460m. At the time it was confidently predicted that crude oil carriers would reach the million deadweight point within a few years, prompting Dubai Drydocks to build a drydock capable of docking such a vessel, which is still in use today. Such vessels were too inflexible, however, and became white elephants and modern large oil tankers, referred to as ‘Very Large Crude Carriers’ or VLCCs carry only a paltry 320,000 tonnes of crude oil, around two million barrels.

‘Seawise Giant’ is normally regarded as the largest ship ever built but technically a vessel called ‘Sea Giant’ delivered from Chantiers de l’Atlantique in St Nazaire in 1979, was slightly larger by virtue of being a less efficient design than the Sumitomo ULCC. ‘Sea Giant’ carried 555,051 deadweight, about 2% less than the ‘Seawise Giant’, but was 500 gross tons larger at 261,453 tons, equivalent to 5.6 Titanics. Having said this, the ship’s actual physical weight was relatively modest at around 75,000 tonnes, equivalent to only around two Titanics.

The Oasis of the Seas is the largest ship afloat currently but is not quite the largest moving object ever built by mankind, as the Titanic was in her day. The ‘Sea Giant’ remains the largest ever but was sent to the breakers yard in 2000 and the ‘Seawise Giant’ met a similar fate in 2010. The largest object currently afloat is a floating oil storage unit (an ‘FSO’), the ‘FSO Asia’, built by Daewoo in South Korea in 2002, which is about 5% larger than the Oasis of the Seas when measured by gross tons.

The Sea Giant is shortly to lose its place to a gas processing vessel that is currently on the blocks at Samsung in South Korea, for delivery in 2016, which is expected to be around 300,000 gross tons when finished, surpassing the Sea Giant to become the largest moving object ever created by mankind. It is expected to be just less than half a kilometre in length which will be around double the length of the Titanic but the ship will be 6.5 times the Titanic’s size when measured correctly by gross tons. For the record, I have no idea how many football fields or double decker busses that length is equivalent to, but it is interesting to note that it is much longer than the Oasis of the Seas, which is a mere 361m long.

In closing I think we have to question the use of the Titanic as a benchmark against which the large size of modern ships can be stated. Its meaning chimes with the emotive nature of the Titanic disaster that has stuck in our collective memory but rationally it is actually rather meaningless. That it is no longer appropriate as a measure of large ship size may be gauged by the fact that, for example, the P&O ferry ‘Pride of Hull’, aboard which many readers may have crossed the North Sea, is 30% larger than the Titanic when measured correctly by gross tons, even though it ‘weighs’ only...
around half as much. That this relatively ordinary ferry is a third larger than the Titanic surely renders the Titanic benchmark for gauging the size of large ships as meaningless?