A Marine Glossary

By Mike Carolin

TONNAGES

I have often been asked to explain the complex question of tonnages. Many non-nautical people ask questions such as 'What does that ship weigh?' or 'How many tons of cargo is she carrying?', or similar. But at sea, nothing is that simple!

Gross Tons

I used to use GRT (for Gross Registered Tons), but it has been pointed out that by an IMO convention, we should now use GT, for Gross Tons. Wikipedia states that Gross Tons is the measurement of all the internal volume of the vessel including masts, funnel etc. However Lloyds Register, and all other classification societies, provide certificates for the Gross Tonnage of a ship based on a complex formula, calculated by naval architects, wherein the internal volume of the vessel is calculated, under the 1989 IMO Convention on Tonnage. Certain defined spaces, e.g. masts, funnels, wheelhouses, are included. The result is a Gross (registered) Tonnage, GT, for the ship that will be internationally recognised. The Panama and Suez Cannel Authorities want to use higher GTs, thus do not allow deductions for those 'certain defined spaces', and insist on their own measurements: always higher than the classification societies GT, and nearer the total internal volume of the ship. Not too complicated so far, is it.

Gross tonnage is a measurement of 'size' of the vessel, being the enclosed volume of space inside the vessels hull, accommodation, engine room, and other structures such as foc'sles, mast houses etc. It has nothing to do with weight. One gross ton equals 100 cubic feet. Always has, and, probably, always will. The word ton comes from the Greko-Roman word tun, which was a large wooden cask. (e.g. How big is your ship? How many tuns can she carry? i.e. size, not weight of cargo). The history of Gross Tonnage is complex and still evolving, as the rules for the calculation of GT change. At one time there were such things as shelter deck ships, alternate tonnage, etc. now long gone. In principle gross tons were only measured in the spaces that could be made permanently watertight, but included most of the accommodation (which could carry cargo i.e. passengers, and the engine room.) Many 'shonkys' existed in attempts to reduce the gross (registered) tons of a vessel, e.g. shelter decks. One recent one up till the 1990's were car carriers, and RORO's. They would nominate, say the fourth deck of nine decks as the 'watertight deck'; usually the deck just above the waterline, that the ramps come off. GRT was only measured below this deck, and the huge space above, not watertight, was not included in the calculation. This was outlawed in the 1990's, and as a result a previous car carrier, initially of say 9774 GRT, suddenly became 24,946 GT, when all the internal car carrying space was included. You will notice the trend with modern containerships to have a comparatively small hull, with many containers on deck, as opposed to the original containerships, e.g. the ex-Japanese, now MSC containerships, with large hulls and less containers on deck. The result is in the GT of the ships. Containers on deck are not included in the GT. However certain authorities, especially the Panama Canal Authority, which uses GT for their dues, are now looking to including the volume of the containers on deck, by virtue of them being 'watertight cargo carrying spaces' – spaces traditionally used in the calculation of GT.

What is the use of Gross Tonnage?

Traditionally, many authorities dealing with ships, e.g. harbour authorities, pilotage companies, tugs, etc. charged fees and dues at 'so many cents per gross (registered) tons'. They insist on independently calculated GT certificates for this: they do not trust the shipowner to state the GT of his ship! Thus they levy on the size of the ship; not how many tons of cargo she is carrying – she could be in ballast. You will notice the GT of passenger ships to be large (all those cabins!), and woodchip carriers (large hull, light cargo) to have higher GT's than say tankers (smaller hulls, heavier cargo.)

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Not complicated at all, so far, is it?

Net Tons.
Like gross tons, Net Tons (NT) is a volume measurement, though rarely used nowadays. In Net Tonnage many more allowances are made for such non-cargo carrying spaces such as the engine room, tanks, crew accommodation etc. It is closer to the actual volume of cargo space available, and is much less than the GT. However for a true volume of the cargo space, go to the specifications of the ship, and add up all the cubic footage of the cargo spaces. Thence if you know the density that the cargo stows at, (the stowage factor), e.g. 40 cubic feet per ton, then you can calculate theoretically how many tons weight will fit in the holds (subject of course to the freeboard/load line/deadweight certificates, below!). Now it gets complicated!

Displacement tonnages.
The actual weight of ship, and cargo, and all else in her, is the displacement tonnage. If it is in 'tons', it is Imperial tonnage of 2240 lbs = 1 ton. If expressed in 'tonnes', then it is measured metrically, and 1000kg = 1 tonne. This is derived from Archimedes Principle that a floating body displaces its own weight in water i.e. the volume of the water displaced x the density of the water = the weight of the water = the weight of the ship. Ships are provided with a scale/table of calculations showing the displacement for any draft. The Light Displacement is the weight of the ship as built – hull, accommodation, engines etc. (but no cargo, fuel, FW, ballast or stores). The Loaded Displacement is the maximum weight that the ship can weigh when loaded to its maximum permitted loaded draft, and includes everything on board. The maximum loaded draft is derived from the assigned freeboard. In the bad old days, ships were sent to sea hopelessly overloaded by greedy shipowners. Samuel Plimsoll, a British MP, forced regulations through whereby ships had to be assigned freeboards, and tonnage marks on the side of the hulls. Authorities e.g. Lloyds, calculated the reserve buoyancy required to make the vessel safe to put to sea. The reserve buoyancy is a volume of watertight space above the waterline, and includes the hull, foc'sle, hatchways, 'islands', poops, and any other watertight structure on the uppermost, watertight deck, that provides reserve buoyancy for the vessel. From this the freeboard is calculated – the distance from the watertight deck down the hull to the plimsoll mark. The freeboard certificate is an important document assigned by a internationally recognised authority, and necessary for the registration of the ship. The remaining distance, from the Plimsoll line to the keel, is the maximum loaded draft. Unfortunately, to further complicate matters, a number of 'load lines' are assigned for different densities of water, and climatic areas of the world: some considered safer than others (look at the side of a ship to see these). Timber loaded on deck is considered 'reserve buoyancy', hence the freeload is less when so loaded. Warships tonnage's are usually only expressed in displacements, e.g. the loaded displacement of a warship is the weight of the ship, fuel, water, stores, spares, ammunition, ballast (if any), etc., on departure for sea. Warships do not worry about deadweight.

Deadweight (DWT).
Deadweight is the result of subtracting the light displacement from the loaded displacement. It is effectively the weight that can be loaded into a vessel. It is near the maximum weight of cargo that can be loaded to take the vessel to her maximum loaded draft, but also includes fuel, water, stores, spares, ballast (if any), but these are usually a small percentage of the deadweight. E.g. If a vessel is listed in Lloyd Register as 37,000 tonnes DWT, it can probably load 35-36,000 tonnes of cargo, depending on the weight of fuel & water carried (per length of the voyage.) The deadweight of passenger ships and car carries are quite small (passengers and cars weigh little in comparison to the size of the ship), and the deadweights of tankers and bulk carriers are critical – every tonne of cargo carried is an extra $ per tonne freight (so don't carry too much spare fuel or water, or the owner/charterer will get shirty.)

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WSS Newsletter Identifications, Specifications, and Definitions.
In the past, many publications, like the newsletter and the LOG, only used GT's and year of build to identify a ship e.g. (20,662/90). This was usually enough for 98% of the ships. Occasionally e.g. the CNCo. 'Chief' vessels, one could get two ships with exactly the same GT, and year of build. It also became confusing with name changes. It was decided to include the IMO No. that all ships have now. The No. is unique to each ship, and that ship uses it all its life, including name changes, and even after being scrapped. We also often include the DWT with the statistics of each vessel. The GT give an idea of the size of the vessels; especially like types of vessels, and the DWT indicates the cargo carrying capabilities of the vessel. Some anomalies become apparent. In the March 2008 Newsletter, the PCC (199mLOA), has a GT of 61,854, and a DWT of 20,120. The bulkie (189m LOA) is 29,449 GT and 52,061 DWT. However, comparing different passenger vessels GT's, (or like types to like vessels) gives an idea of the relative size of those vessels. Containerships are a bit more complicated as they carry differing amounts of containers on deck, (not included in the GT) hence we often include the TEUs.

International Maritime Organisation (IMO).
Sort of like the United Nations of the Maritime world: an International meeting place of Government representatives who agree (sometimes!) on International conventions on many maritime subjects e.g. standards, certification, safety, oil pollution prevention, manning & education, etc. They usually vote on resolutions presented by sub-committees after years of research. One example recently was compulsory pilotage in the Great Barrier Reef. The convention becomes international law after a certain percentage of member states accept the recommendation. Individual country's governments then pass the required acts to make it law for that country's ships. They are often dealing with very controversial subjects, and meet great resistance sometimes – just like the UN!

Length overall (LOA).
This is the length from the tip of the bow to the end of the stern, i.e. the extreme length. Also a good indication of the size of a ship. Sometimes the length quoted is Length BP (between perpendiculars), i.e. the waterline length from the bow to stern along the waterline: always shorter than the LOA.

Twenty Foot Equivalents Units (TEUs).
An indication of how many twenty foot containers a containership can carry. Since some ships can carry both twenty foot and forty foot containers in a variety of combinations, so TEUs reduces this to a common denominator between ships. Originally, containerships were built to carry 20' x 8' x 8' boxes. Now every one of those dimensions vary, including with 40 footers, which often makes the designed lashing arrangements very difficult. The Americans (yes, them again!) are even looking to introduce 53' containers on the North Pacific run. I do not know what their TEU rating would be.