

Common Big Ship Surveys – Pt 1 Draught Survey

This article is the first in a series to address calls from members to have some “technical” articles. I would not class this as technical, but most of the technical stuff is nowadays handled by a computer program, so I am assuming some level of prior knowledge. Consider this as a guide or a checklist only. We will not be discussing the actual calculations required; however, I do emphasise the importance of manual draught survey calculations to provide an understanding of the process. Our computers are a constant and reliable companion these days and we rely on them to a great extent; nonetheless, having the ability to conduct a timely manual calculation is good professional practice.

The article is based upon my experiences and is my opinion only, as a genuine reflection of the real world I work in.

- The draught survey is quite simple – using a few tricky (accepted) formulas applied to Archimedes Principle. Thank the Gods for the Greeks!
- It is used for dry bulk cargo vessels but can be used on occasion for other vessels in unique circumstances (e.g. molasses tankers – see at end of article).
- Reading draughts – no magic bullet solutions, sorry. You must establish your own method and then compare with peers. You may be doing this in a mirror calm harbour or in 2 – 3 metre swells at DBCT, so you may require several different approaches. I believe it is common for some to typically read a little high and some to typically read a little low. I am not talking about a C/O trying to get something for nothing, but Australian based surveyors operating in acceptable manner and doing the job properly. You may, in time, get feedback from a colleague at the discharge port to highlight your average accuracy. Over time a preferred process will become apparent and you are on your way. If you can't get this right after a few weeks, I suggest you try something different.
- Reading the off-side draughts - maybe via boat (not commonly accessible for surveyor these days), someone else who can read draughts who happens to be there in a boat (lines launch during tie up), water tube/manometer (ship's or own), using ladder (safety rules may prevent this in some places) or sending a camera down the side (any others?). These methods generally provide only the midship draught and shall be used on a case by case basis.
- “How do I obtain the fore and aft off-side if only the mid-ship is known?” you may ask. Usually by comparing the estimated width at water level of the draught marks with the mid-ship width. Is it one quarter, a half, etc? Simply apply this to the read draughts and you have a reasonable estimate. Small differences in fore and aft draughts will make a minor difference in calculation of mean draughts, but difference in mid-ship draughts will have a much greater impact upon the accuracy of the survey (Note to self). On some vessels, the forward draught marks are visible from the forecastle, thus leaving only the aft draught to estimate. This is a worthwhile exercise as it will give a good idea of how well you estimate.
- In what cases are accurate draughts important? All I hear you say! Generally, high value cargoes like alumina, mineral sand, concentrates, etc. for obvious reasons. Coal and Iron ore, for example, being big volume revenue earners may call for somewhat less diligence, as dictated by industry and client acceptance of same so, please, no self-righteous rants over this subject!
- Calculate the corrected draughts using the appropriate distances corresponding to read draughts. What now? Keel corrections. This was almost a dirty word and I place the blame squarely with Chinese shipbuilders. Once such a thing was rare, but now it is common. You can

adjust your corrected fore, mid and aft draughts before calculating the quarter mean or calculate as read and then deduct. Alternatively, your snazzy software may cater for this in some tricky way (ours does); nonetheless, it can be confusing if you wish to compare with C/O. Best compare the displacement in this case (getting to that shortly). It is important to read the “instruction” within the loading manual for how to calculate, so you can understand what is going on. Better still, only attend for Japanese built with simple tables!

- Once you have the mean of mean of means (quarter mean draught), then onto displacements. This is where the “tricky” maths occurs, including 2 trim corrections and a density correction – no, that’s not a reference to your mental capacity! Dock water density should be measured using draught survey hydrometer (the most common and industry accepted being ZEAL brand made in England) using a sample of water drawn from about mid-ships at half the vessel’s mean draught. Density can also vary a lot during rainy seasons or if in a river, so take care and check often during these times.
- Known weights – acceptance of engine room log fuel figures and freshwater figures is universal in Australia (okay, perhaps freshwater is occasionally checked), but ballast tends to go hand in glove with off-side draught reading – high value cargo, check ballast; high volume cargo, agree constant – see below.
- Constant – if it seems way too big, then likely it is. Ask for proof (previous surveys) or better still, sound ballast to confirm. It is a good practice in any case. **NB** Check for changed light ship weights due to fitting of exhaust scrubbers to comply with Sulphur Cap 2020.
- Okay, so you have completed the initial – have you confirmed with C/O that you both have same displacement? Do you agree about the constant? Any other concerns?
- Final survey – have they used freshwater or just turned it into grey water – did you discuss this at initial survey? (note to self) Discharge into harbours is strictly regulated!
- Is ship listed (heeled) and is the manometer accurate? How do you check that? Are you using a ladder? Maybe a boat is available. Heeling gauges found in ship’s office or ballast room may not be very accurate but give a reasonable idea to compare with manometer.
- If loading (or unloading) at an established terminal, they may have reasonably accurate belt weighers that can greatly assist if required – they will certainly be used for cargo distribution, as there is little else to go by. Some vessel loading programs will be quite accurate for this as another option, but don’t rely on that.
- There you go – simple! Well it may sound simple, but we have not discussed the biggest issue we all face: communication! Just remember that draught survey is only 10% mathematics, and success comes down to how well you get along with the Master and C/O. Good luck.
- What is the correct name – Draught or Draft? I am in the Draught camp; however, if your client wants Draft, just do it! This bit really is simple!
- My parting advice – if things are not working out, slow down, check thoroughly and don’t panic. When all seems lost, phone a friend. The AIMS has many dedicated, experienced members who will support you to become the competent, ethical surveyor we are renowned for.

So now you all realise that this was not a technical article after all. I did try to warn you! However, I trust it has been helpful for some and entertaining for others. No doubt it will upset a few. We are a weird bunch like that! At the end of the day, it is simply to help those who are starting this journey.

Conundrum to help avoid Alzheimer Disease – why do a draught survey of a tanker with molasses cargo? Answer: next time!

Hang on, what’s a conundrum?

John Holden

Signing off from sunny Gladstone.

Next time: On and Off Hire Surveys.