



**A review on ship recycling methods and their images**

Or: another approach to bring the politically driven viewpoints back to technicalities.

Sustainable shipping in relation to technical standards and Corporate Social Responsibility of stakeholders is discussed controversially since many years in the maritime community and amongst legislators. The outcome for new and existing ships as well as ship recyclers is not only the “Hong Kong International Convention for Safe and Environmentally Sound Recycling of Ships” of IMO (in 2009), but also an EU-regulation copying widely the IMO requirements. As usual with additional authors there is always an attempt to “improve”, in case of ship recycling not the relevant safety or environmental management aspects are in the focus, but an entire ship recycling region questioned which stands for more than ¾ of the global recycling capacity.

**Starting Point**

Primarily the four ship recycling methods recognized and described by Hong Kong Convention, EU-Ship Recycling Regulation and ISO 30000 –namely beaching, landing, alongside, and dry docking – describe different forms of access to and egress from a ship which is recycled. Surrounding aspects like handling of materials by gravity, hand, different types of cranes etc. is a secondary characterization. Key aspects for safe and environmentally sound ship recycling are awareness, training, management of materials within the ships, transportation in the ship recycling yards, storage, disposal, record keeping and many other aspects which have a significant effect on the HSE in this industry. All of these factors have to be considered in its individual combination (as required by IMO and EU for Ship Recycling Facility Plans) plus the environmental conditions surrounding the facility.

A study carried out by M.A.R.C and GSR Services in 2013<sup>1</sup> about requirements and compliance options for the different ship recycling methods has led to the following conclusion:

Method	Management	Emergency preparedness	Operate from built structures	Containment / imperm. floors	Disposal, hinterl. waste management	Market share [2013]
Beaching / Landing	+	+/-	+/-	+/-	+	73,9 %
Along-side	+	+/-	+	-	+	20,2 %
Slipway	+	+	+	+/-	+	4,4 %
Dry-dock	+	+/-	+	+	+	? (1,5 %)

“+” = easy / possible; “+/-” = moderately possible; “-” = impossible / difficult fulfillment of requirements

The result is, that none of the ship recycling methods has major advantages compared to the others and all can meet the legal requirements in one way or the other. Only alongside has a difficulty for protecting the water in form of impermeable floors whereas dry-docking has an advantage as it provides a complete secondary containment. Dry docking is not applied for ship recycling today due to various reasons. It is obvious from above that ~98.5% of ship recycling is happening inside or above water today.

<sup>1</sup> [http://gsr-services.com/images/stories/update\\_04-05-13/8a.pdf](http://gsr-services.com/images/stories/update_04-05-13/8a.pdf)



No general statement about method applied and HSE-level achieved is appropriate. Statements about achieved quality can only be done for individual ship recycling facilities and their management, but not based on countries or the method applied as a stand-alone criteria. Due to ongoing discussions on “beaching”, which has by far the biggest market share and capacity, it is crucial for acceptability and enforcement of legislation, some considerations are highlighted.

### **Comparison of Landing and Beaching**

There are hardly any obvious differences between the so called landing and beaching method. Both have nearly identical possibilities for providing the strongly demanded and required impermeable floors and drainage systems plus “management of inter-tidal zones”.

What is well visible is the handling of blocks which are cut out of the hull. In Turkey these blocks are smaller and handled by mobile cranes. In India bigger blocks are cut and fall either into the sand or inside the ship and are then pulled ashore by winches<sup>2</sup>. In case of the ship recycling facilities I’m working with in India and Pakistan, no “dirty blocks” containing oil or other polluting materials, are allowed to get in direct contact with sand or water. These blocks have to be fully cleaned prior to falling or go inside the ship, the sandy gap between ship and impermeable floor is then to be covered, and it has to be brought directly -in case of India- to the concreted “oily block & equipment handling area”. This area has of course a proper drainage system.

However, when debating about similarities or differences as well as general acceptability of landing and beaching method, most often highlighted is protection of inter-tidal zones in combination with the tidal range. Today we’re dealing with sub-categories differentiating between “tidal” and “non-tidal” beaching, or landing, or whatever, let’s better say ship recycling. It is still not clear which tidal range can be considered “non-tidal” or if ship recycling facilities operating with alongside method at a pier located in rivers can be excluded from providing similar evidence for their management of the surrounding waters or “inter-tidal zones”. That seems to be a matter of the individual intentions or existing image of the ship recycling methods.

Back to beaching and landing. What can be recognized is that other conditions like the profiles of the beaching or landing areas are seldomly considered. In combination with the “tidal range” these natural conditions have a huge impact on the risks and required preventive measures. The following provides some thoughts.

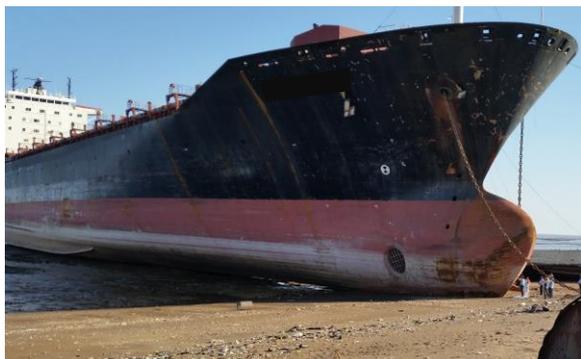
Starting point are the very ship recycling countries Turkey and India which have different public images as well as combination of tidal ranges. In Turkey the landing method is applied and the tidal range is approx. 20cm. On the other side India has a tidal range of more than 10 meters and applies the beaching method. Additionally the profiles of the beaches in India and Turkey are quite different. In India we most often see a gentle slope and the ships’ hull is mostly lying on the semi-hard sand. Sometimes in the forward section the hull is not fully supported, due to cutting the hulls’ sides it starts weakening and bending (see 2 photos below). I have never seen that the hulls’ bottom was punctured or the sides were damaged other than showing some wrinkles.

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<sup>2</sup> This practice is criticized as well, as paint chips (I would call them particles due to their size) are released into the environment and they might contain organotin compounds (better known as anti-fouling) and heavy metals. That’s correct, even though organotin is hardly found anymore, thanks to IMO and AFS-Convention. What is the situation in ports or shipyards worldwide? How much paint is re-applied on ships during dry-docking and what is remaining after 2 years of travelling? Is it only a problem applying to ship recycling? Probably not as soil samples from port and shipyard areas have shown significant levels. In contrast samples from shorelines at ship recycling facilities in India have not shown high concentrations of heavy metals or organotin. An issue to be closer investigated.



Safe positioning of ships in the huge tidal range in India is maintained by ballasting / de-ballasting of the ship for ensuring that it is not moving until the recyclers want to pull them further up with winches during high tide, preferably spring tide.

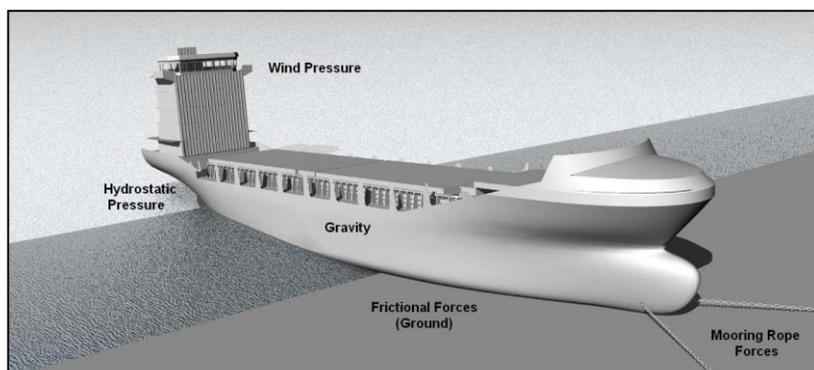


Unsupported part of hull

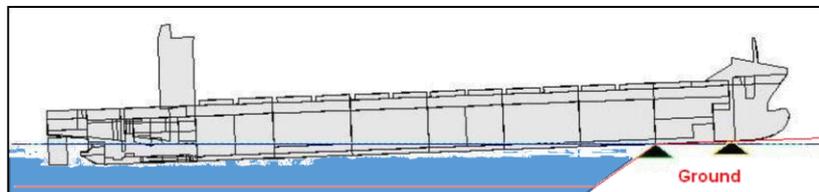


“wrinkles on hull side”

In Turkey there is a solid step just a few meters from the shoreline and the bending moments in the hull are the opposite of those in India. In Turkey ships are also pulled further onshore by winches, but ballasting is not done as in India as only a small part of the hull is in contact with sand/gravel. The forward section is on the hard standing beach or, in case the ship is further onshore, nearly aloft and the aft remains afloat during most of recycling process. A movement of the vessel during recycling in Turkey can hardly be avoided and the ship has a “turning and resting point” on the ground. This should be looked at in more detail as it raises some concerns.

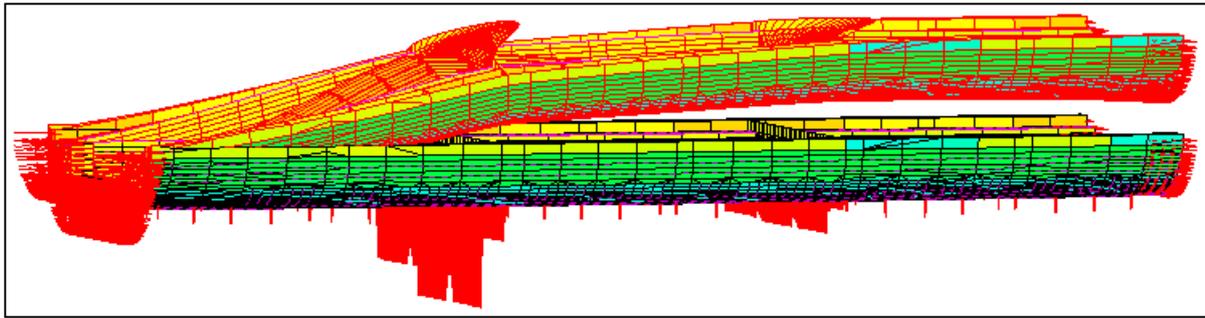


From the side it looks like the following (schematic):



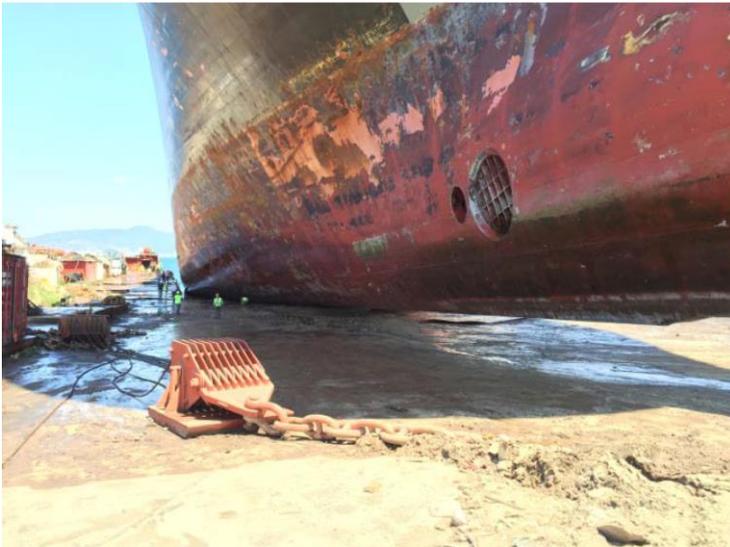
This drawing and related calculations are based on the assumption, that the forward section is resting entirely on the shoreside slope, which is idealistic. The bending as shown in the following drawing (scale factor 300) is based on calculating the “ideal case” and can be understood as minimum approach:





Not considered in the calculation is neither the grinding of the hull on the gravel beach due to the movements of the aft section nor the stress on the ships' hull when the onshore part of the ship is not fully supported because it's aloft.

The following photo shows an unsupported forward section of a ship recycled with the landing method and gives an idea, that bending moments are much higher than those calculated:



Source: [https://www.hapag-lloyd.com/de/press\\_and\\_media/insight\\_page\\_42540.html](https://www.hapag-lloyd.com/de/press_and_media/insight_page_42540.html)

Also the thesis<sup>3</sup> provides an example for a cruise vessels where far more critical impact levels have been identified.

## **Conclusion**

I've not heard about a ship which broke apart during recycling with the landing or beaching method. If this has ever happened, would we have been informed? I don't know, but in 2013 I heard about a terrible capsizing at a ship recycling yard applying alongside method .... Does this help? I don't think so, let's better focus on individual approaches and how ship recyclers comply with legal regimes, corporate social responsibility standards and consider their surrounding conditions including their own organization for establishing a good HSE-standard. Meeting requirements is what counts and there is much more than just the visible method of

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<sup>3</sup> All drawings taken from the Master Thesis: "INVESTIGATION OF POSSIBLE HAZARDS DURING SHIP RECYCLING THROUGH NUMERICAL CALCULATION OF SHIP STRENGTH AND BASED ON FEM", YILDIZ TECHNICAL UNIVERSITY, Naval Architecture and Marine Engineering, prepared by Dođuhan Hazar CENGİZ in May 2010



ship recycling as shown in various magazines. It's mostly all about risk identification, awareness, training, housekeeping, management, and much more, in total ~400 different aspects. Prejudices on hand of the nationality is not fair or appropriate, let's see the individuals and their approaches. I hope we can agree on this as a starting point.

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