

Ship planning and hazardous cargo



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ABSTRACT

This project aims to provide an insight of the container shipping industry, in particular the “mega-vessel”. “Mega-vessel” here is referred to as large carrying container vessel which is commonly referred also to as a VLCC (Very Large Container Carrier) or ULCC (Ultra Large Container Carrier).

By doing research on the factors or/and constraints that limit the size of container vessels will give a better understanding of how the container industry has been evolving till present. We will look into seven areas which can affect the decision of constructing large container vessels. Factors or/and constraints that limit the size of container vessels are important points to look into when deciding whether or not to proceed with a decision of building larger vessels for the purpose of optimizing vessel space and achieving economy of scale.

INTRODUCTION

Container shipping industry has been expanding in terms of vessel size since it first came to existence in the 1950s and is expected to continue to grow gradually. In the 1960s, the so-called largest container vessel had a container capacity of 1, 000 TEU then increased to 2, 000 TEU for the following 10 years and so on. From then on, it has reached to the present biggest container vessel, Emma Maersk with capacity of 11, 000 TEU. Now an entire industry has come into sight and therefore container terminals have become a crucial link to the chain of intermodalism.

Malaccamax is referred to vessel of 21m draft permissible to pass through Malacca Strait – a major shipping route between Europe and Asia. Adding the

10% underkeel clearance, the minimum channel depth of at least 23.1m is required in port and alongside the berth. She would have a capacity of 18,000 TEU, a length of 470m and a beam of 60m. Even so, with Suez Canal planning to increase the cross-section breadth and depth over the coming years, Malaccamax will be able to pass the Suez Canal in the future as its current narrowest width is at 60m.

With the trend towards building larger container vessels, ports even more incapable to accommodate them. Terminal advancement and dredging are some of the options for existing harbours to decide and some ports already have plans to deepen or widen its channel or berth depth.

To some, this may not be feasible to construct a larger vessel as not only it is a challenge to design it in a way it is safe to navigate but also gives more room for casualties like grounding and navigational error.

FACTORS AND CONSTRAINTS THAT LIMIT THE SIZE OF CONTAINER VESSELS

A container terminal is a facility that handles ocean-going vessels along the coastline to manage the movement of cargo (containers) in and out of a country. A typical container terminal consists of berths, yards, quay cranes, storage area, equipments to handle containers, gatehouse that controls the flow of containers in and out of the yard and administration building.

In this section, we will look into the factors and constraints that limit the size of container vessels.

Port Infrastructure – Terminal

Water depth

The water depth of a berth has to be deep enough to accommodate Malaccamax which is said to have a draft of 21m. Ports with shallow draft will face a problem when Malaccamax calls in the port. They may have to deepen its draft through dredging or expanding the land used for storing of containers as part of the port development.

Quay length

The quay length is defined by the expected size of vessel to call at the terminal. Since this research is about Malaccamax, she would have a length of 470m, thus the berth needs to have a length capacity sufficient to take in Malaccamax for loading and discharging of containers.

Beam width

Beam width is to be taken into consideration as part of the port development to accommodate future vessels. The entrance channel should be wide enough for her to pass through.

Quay cranes are to be replaced with highly durable and that the outreach of the cranes can be extended and reach the very last row of the ship. Lifting capacity is also an important point for handling of hatch cover pontoons.

Storage space

To expand the landside container storage yard should be done if future large vessel like Malaccamax is to be constructed. Especially now with the no. of containers handled will be increased, most likely the port would need an extension of storage space as well as CFS (container freight station) for stuffing and stripping of containers.

Another constraint that the yard can have is the dwell time – the time cargo (container) remains in a terminal's in-transit storage area while awaiting shipment by clearance transportation. The longer the dwell time, the lesser containers can be handled at any one time. By expanding the storage area, will reduce the time taken to handle containers which are waiting to be transferred out.

Ship's design and cargo handling

Ship structure

The ship's structure has to be able to carry more containers in cargo holds as well as on deck. It should also allow a better field of vision from the bridge to navigate the ship. The bow has to be strong enough to withstand the bow impact during the journey. It should be built with concrete frames, in a way to reduce torsional stresses and internal and external forces.

Engine

In today's ship, it is equipped with one propeller, with the largest diesel engine manufactured (12 cylinders), maximum boring (980 or 960 mm), the power available is approximately 93. 000 BHP (68500 kw), which gives a maximum speed of approximately 24-25 knots, which is required by industry. Now with the expansion of container ship size, one propeller is not enough to withstand the large vessel. The diesel engine should also be increased to maybe about 14-16 cylinders so that the maximum speed of the vessel can remain the same or even increase to higher knots.

All designs beyond the 9, 500–10, 000 TEU limit require alternative propulsion, either twin screw or some kind of combination with pods or contra-rotating propellers. Using double propulsion can be another option for <https://assignbuster.com/ship-planning-and-hazardous-cargo/>

larger vessel like what the small draft tankers used. Capital costs, fuel costs and daily operating costs all will go up with a twin screw ship, however the advantage of using the double propulsion is that if one of the engines breaks down, the ship can still be controlled by another engine. This increases the investment and hence offsets the economy of scale incentive for bigger size. If it happens, there will most probably have to be a jump in size to compensate for the increased capital cost.

To meet the SOLAS requirements for bridge visibility on such a large ship, the design envisages the separation of deckhouse and engine room. The innovative arrangement of the deckhouse in the forward part of the ship permits an increase in container capacity and a reduction in ballast water.

Container lashing

Lashings are essential and every container vessel will carry lashing equipments like lashing bar, turnbuckles and twistlocks used to secure containers onboard, especially in the present situation where containers are stacked as high as nine high.

Even so with the securing of containers, sometimes accident happens and containers collapsed like dominos. To reduce the risk of further accidents, some ways can be adopted like considering temporary reduction in container stack heights, revised weather routeing and replacement of lashing equipment.

Sometimes, lashing bars can also break. Probably the reason behind it is that heavy container is stacked onto lighter ones. This is where the job of a ship planner comes into picture. The ship planner has to plan loading of

containers in a way it is safe from the loading point till it reach the discharging point.

With Malaccamax coming along, lashing of containers becomes more vital and needs to be carried out in a safe manner. It has to be regularly checked and assessed and if needed, to tighten the lashing bars.

Crew

Crew plays an important role in ensuring that the ship is properly manned. Without crew, ships cannot sail. With regards to Malaccamax, qualification and competency of a crew is a challenge. Of course with this, they would require the best crew onboard. Simulators also need to be further advanced for bigger ships.

Most vessels employ 13 crews on board, however in the case of Malaccamax, it has to be increased to do the daily routine. 13 crews onboard can't possibly handle such a large vessel.

Cargo (reefer)

Usual accidents that we also hear from container vessels are loss of containers, collision, fire and some cargo claims especially with regards to reefer containers.

In this case, reefer containers pose a kind of problem because it has to have power points for the reefers to operate. Power points are to be situated at one side so reefers will be placed together at a single point. Crew has to also check the temperature needed depending on its content. That is one of the reasons why reefers cannot be loaded in cargo hold.

Technical constraint

Cargo handling equipment (quay crane, mobile crane, gantry cranes, etc)

The life span of a crane is 40 years but the useful life will not be more than 25 or 30 years. Improved and automated handling equipment is required for the ships' turnaround time to be reduced. Port can also improve on the yard productivity to overcome the situation.

Road and rail intermodal connection

It is important to improve the situation in port. Currently, we are facing the common constraint in yard which is congestion. By expediting on the technology, we can utilise the container space even more by higher stacking of containers.

Gatehouse can also be replaced with automated gantry that allows trucks to move in and out of the yard with less difficulty. The terminal operator can install some kind of a system that can see through the trucks for security purpose. That will reduce the employment of staff for the job and also reduce the waiting time for trucks to get in and out of the yard.

Some countries have rail system where it will transport containers from one place to another place using railways. Now with more containers coming in the port, the system has to be amended for an example to use double stack or triple stack high on rail. With this kind of system, it can carry at least twice the normal no. of containers being transported by rail.

Turnaround time

It is obvious that the ship's turnaround time would be slower for large vessels like Malaccamax. Therefore it is the ports' trading speed that will

attract ship owners to acquire any services needed. Ports should stay competitive especially when handling large vessels like Malaccamax since not many ports have the capability to deal with it.

Container handling equipments will have an impact on the turnaround time. To reduce it, maintenance of the equipments needs to be in a regular basis so that the efficiency is maintained at a high level. To use additional cranes or faster hoist speeds and trolleys can minimise the constraint in port.

IT

The crippling of the port need not be through the destruction of physical assets—it can also occur through the disruption of the information systems controlling port flow. Only a sophisticated information network management system can allow the port to manage the volumes and complexity of handling different cargoes all at once.

As the hub ports grow bigger, even more information needs to be processed and disseminated. This makes the hub ports—and the entire maritime shipping structure—even more vulnerable to disruption of the information network itself.

Operational cost

When we talk about Malaccamax, being the future largest container vessel to be constructed, surely all sorts of costs will increase especially the bunker cost. With twin engine usage and heavy deadweight will consume more bunkers. With the maintenance of ships' engine, other equipments and all as part of the operational cost, it would definitely increase as compared to smaller vessel of say 8000 TEU.

Speed of a ship is of critical importance as ship will enjoy economy of scale when she is at sea. When in port, capital cost will start building up.

CONCLUSION

The growth of vessel size and the development of hub ports are the result of the search for efficiencies and profit by private businesses competing in a fierce shipping market.

The growth in demand for container ships is required to provide employment for the rapidly expanding container ship fleet. When talking about business, of course risks are involved and when times are bad, the container ship industry will be greatly affected especially with the economic downturn crisis at present.

Although the container ship is a type of reliable ship, the rapid development of new bigger designs and the increasing value of the cargo call for a more proactive approach in order to deal effectively with the hazards currently associated with container ships. The industry as a whole must focus on these issues and find suitable solutions.

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