The containership – how big: What are the prospects for MalaccaMax?

Zia H. Rizvi, P. Eng., Consulting Engineer, Toronto, Canada

The chronology of containerisation since McLean's first trial run in April, 1956, using Ideal X, a converted tanker, is nothing but impressive. Even more impressive is the evolution and growth in the size of purpose-built fully cellular containerships, which arrived on the scene in 1968. As more and more fully cellular ships were constructed, they were categorised into 'generations'.

Generations

- First generation – 1968. Maximum capacity 1,200 TEU.
- Second generation – 1969. Maximum capacity 1,750 TEU.
- Third generation – 1971. Maximum capacity 3,000 TEU. The third generation culminated with the commission of Hapag Lloyd's 3,050 TEU Frankfurt Express in 1981.
- With the fourth generation of US Line's 4,458 TEU 'Jumbo-Econ' ships in 1984-85, the containership reached the maximum permissible dimension for transit through the Panama Canal. The first containership *American New York* made the headlines for her drum beat of 'around the world in 84 days'.
- Following soon were APL's five 4,340 TEU containerships, which broke the Panamax barrier.
- Although the first post-Panamax containership, *APL Truman*, was put in service in 1988, it was not until 1995 that major shipping lines followed the example of APL. At this point containership size started rising by leaps and bounds. The rise was led by *Regina Maersk*, the then flagship of Maersk Sealand, which broke the nautical architecture barrier in 1996. In doing so, it became the first containership capable of carrying over 6,000 containers. This amazing new 'state-of-the art' containership was the first in the world to have a 17th row of containers across the deck and 14 under deck. It was also the first containership in the world longer than 300m.
- In 1997 Maersk embarked on 19 S-series of 6,600 TEU ships beginning with *Sovereign Maersk*. The S-series were later rated at 7,226 TEU. Maersk held the title of owning the biggest containerships for six years up to 2002.
- In 2003, OOCL stole the show by ordering twelve 8,063 TEU containerships, with *OOCL Shenzhen* the first ship launched on April 30, 2003.
- In 2004, China Shipping's *CSCL Asia*, at 8,468 TEU, became the largest operating containership.
- In 2005, the two sister ships *MSC Pamela* and *MSC Susanna*

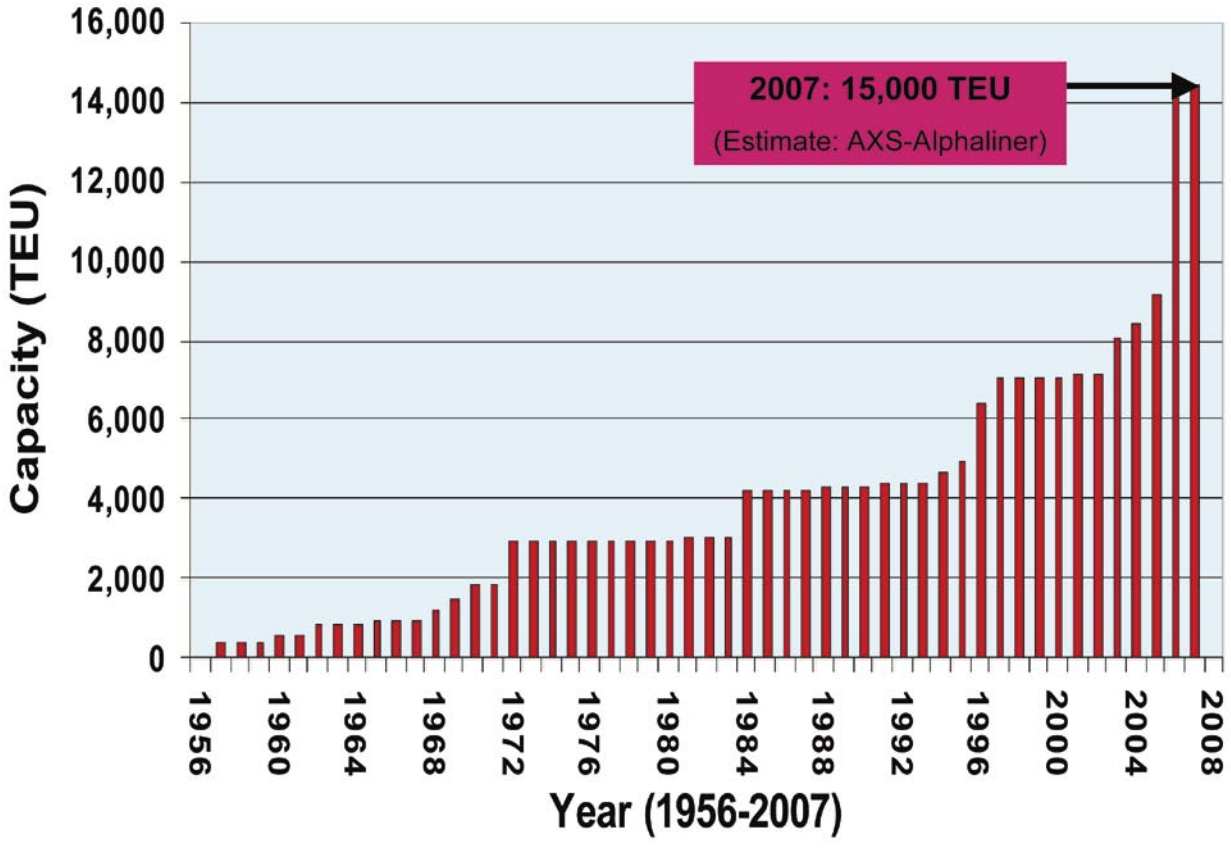

Figure 1. Growth of containerships (1956-2007).

(9,200 TEU) were launched, and were the biggest ships operating to the end of the year.

- As if this was not enough, on September 1, 2006, Maersk took the delivery of *Emma Maersk* with an 11,000 TEU capacity. Many analysts believe this figure to be much greater, possibly approaching 15,000 TEU. This is currently the largest containership in the world. In total 8 of these ships are operating this year.
- According to an April 23, 2008 press release, COSCON has ordered eight 13,350 TEU capacity vessels. Most probably these would be also of 15,000 TEU capacity.

To sum up, today the maximum size of containership has gone from a mere 58 trailers on the spar deck in 1956 to 15,000 TEU today (Figure 1). Yet, the shipping industry is still in expansion mode and building big is in favour. *Emma Maersk* has reached Suezmax size, superseding all megaship designs of this size. The only design left on the drawing board for bigger ships is the MalaccaMax of 18,000 TEU, sponsored by the professor-student team of Prof. Nico Wijnolst and student Marco Scholtens at the Delft University of Technology in the Netherlands (Figure 2). The question asked now is: what next?

To answer this question, one is prompted to ask a number of questions in return:

1. What do the Pundits say?
2. What are the commercial implications?
3. What does the history of containership growth suggest?
4. What does the history of ports' development indicate?
5. What are the port constraints?
6. What are the safety and security issues?
7. Who could be the real beneficiaries?

Let us examine these questions in brief.

1. What do the Pundits say?

In the past, a number of highly credible and leading authorities attempted to predict what the containerships of the future would be like, and when would they be in operation (Table 1).

TABLE 1: PAST PREDICTIONS FOR MAXIMUM CONTAINERSHIP SIZE

What do the Pundits say?

Authority	Year of Forecast	Maximum size	Expected Operation
Charles Cushing	1985	6,000-10,000	Unspecified
GL (Hans Payer)	1997	8,000	By 2000
Samsung	1999	8,700	By 2000
Lloyd's	2000	12,500	By 2008
Bureau Veritas	2001	12,500	Unspecified
Delft (Malaccamax)	**2001**	**18,000**	**Visionary**

Two things are noticeable in these predictions. One: The rise in the size of containership has exceeded all previous predictions. And second: MalaccaMax, which was considered only a visionary design in 2001, has come into focus again.

The two main issues of the late 1990s are again in discussion. These are technical viability and economy of the size of bigger ships.

According to some experts, there are no technical or naval architectural limitations that would prevent the construction of ship of this size. "In strength terms, there is nothing standing in our way to enable us to make ships of this size work structurally and operate safely", remarked ABS' Bob Spencer as far back as 1999. However, a number of design problems still have to be sorted out including propulsion, power, speed, fuel consumption, vibration, manoeuvrability, container securing, etc before these ships are ready to be launched.

As for the second issue, it goes without saying that the driving force behind larger container vessels has been economy of the scale of size. According to the sponsors of MalaccaMax, the 18,000 TEU ship has an overall lower cost level of approximately 16 per cent over containerships of 8,000 TEU.

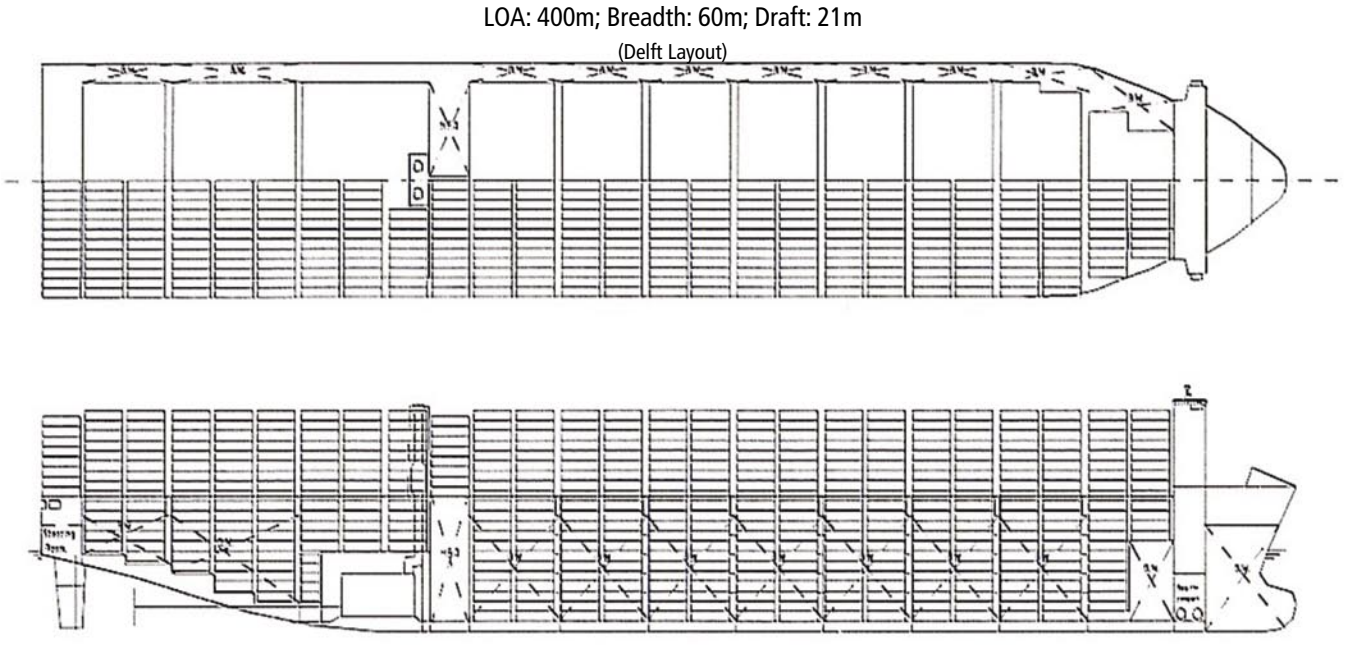

Figure 2. MalaccaMax: The mother of all boxships.

Opponents, however, argue that beyond 8,000 TEU it is hard to detect the savings in moving from an 8,000 to a 10,000 TEU vessel.

A question then arises: how come there has been a sudden jump in the rise of containership size above 10,000 TEU in such large numbers. As of June of this year there were some 169 cellular containerships of 10,500 – 15,500 TEU on the order books, on top of another eight ships already in operation, according to the AXS-Alphaliner database. And yet orders are continuing to pile up. Apparently in a world of cut-throat competition, 16 per cent can make a decisive difference. Considerable market opportunity is also possible if port calls are reduced.

2. What are the commercial implications?

The rise in the size of containerships is hinged on two main premises i.e. increase in trade and utilisation of ships to a profitable level of capacity to about 80 per cent. A question then arises: what happens if, because of overcapacity, trade increases but utilisation does not? Let us examine this question in more detail.

According to OSC high forecast scenario, the world port container throughput may grow from 229.5 million TEU in 2000 to 611.0 million TEU by 2015 at about 6.7 per cent p.a. In fact, the actual growth from 2000 to 2006 has exceeded the above average rate: it is 11.0 per cent (From 235.0 million TEU in 2000 to 440.4 million TEU in 2006 according to Drewry statistics). Even if we take the figure of 6.7 per cent, there will be a doubling of port throughput every 10 years or so.

The Drewry analysis of trade also shows that the container trade is concentrated in certain trade routes. In 2006, out of the total world container trade of 128.32 millon TEU, the East-West trade routes carried the maximum at 43 per cent, 55.54 million TEU.

Of this 55.54 million TEU, the Europe–Far East corridor carried the lion share (42 per cent), followed by Transpacific at 35 per cent. All other routes combined carried only 23 per cent.

No doubt trade has been growing strongly and is concentrated in two routes, Far East-Europe and Transpacific. The issue here, however, is not that demand for new and bigger ships is not there; it is rather how the question of overcapacity will be addressed. Bigger is better in the box business, only if you can fill it up. It is a well known fact that the carriers have not been very prudent in managing overall capacity. According to AXS-Alphaliner database of June 2008, there will be a total of 5,788 cellular containerships by the end of 2011 with an aggregate capacity of 17,706,885 TEU. Against this there were only 3,945 ships of a total capacity of 9,583,190 TEU as at the beginning of 2007. This amounts to an addition of some 84.8 per cent capacity within a short period of only five years.

The trade growth is therefore not a guarantee of a liners' reasonable rate of return. In fact, overcapacity has always been the industry's main problem.

3. What does the history of containership growth suggest?

Since the first three 'generation' containerships appeared on the scene from 1968 to 1971, the history has been that of a 'Stop and Go' trend (Figure 1). This trend is apparently a reflection of the 'Wait and See' strategy of various shipping lines: Wait until one of them plunges into the sea and see the results. Others will then jump on the band wagon. The race for ever bigger ships appears to now be activated with the launching of Emma Maersk and her seven sister ships. As stated earlier, there were some 169 ships of +10,500 TEU on the order book besides eight ships already in operation as of June 1, 2008. And yet more and more orders are piling up.

4. What does the history of ports' development indicate?

Generally, the ports have kept themselves ahead of the requirements of shipping. This is clear from the following facts.

- In the 1950s, the early years of containerisation, ports developed standard berth lengths of 200 m and low water depths of 11 m that served ships very well for about 20 years until the time when First generation containerships evolved in 1968.
- In the early 70's, the ports of New York, Rotterdam, Singapore and Hong Kong became the fore-runners of the supporters of fully cellular containerships even when some shipping lines had doubts about their sustainability. Their 300 m standard berth lengths serve the industry very well even today with only few improvements.
- In 2001, the maximum capacity of ships was only about 7,000 TEU. Yet, a number of hub ports started equipping themselves with gantry cranes that could handle Suezmax with 22-wide boxes across the deck. This strategy has paid them good dividends.
- Presently, most of the mega ships operating, except a few, have a draught of 14.5 m. In spite of this, a number of ports are providing depth of 18 m alongside. A port such as Karachi Port in Pakistan which is not even on the mainline route is providing this depth.

5. What are the port constraints?

The three golden E's of port infrastructure in terms of requirements to cater to these leviathans are shown in Table 2.

Naturally the opponents may ask the question: how many ports in the world would be able to meet these requirements without stretching their resources to the utmost limits except a few CEOs bold enough with a fighting spirit and lot of tax payer's unused money?

The proponents, however, may argue that these big boats will be using only the end ports of a shuttle service. For example, in the transpacific route one port each is used on the West Coast of North America and the North-East coast of Asia. They will have no use for the intermediary ports unless Suez Canal is further deepened and widened. In that case, SCCT or Salalah are well placed between end ports of the Far East-Europe route because of the large distance involved.

TABLE 2: BASIC PORT INFRASTRUCTURE REQUIREMENTS TO CATER TO MALACCAMAX

The Three Golden E's

Three "E's"	Parameters	Requirements
Expansion	Berth Length	450 m
	Depth Alongside Terminal Area	23 m 32 ha per berth
Equipment	Gantry Cranes	70-74 m outreach 70 cycles per hour 6 per berth
Efficiency	IT System	State of the art
	Landside inter-modal Connection	Double stack fast rail transport to hinterland load centers

6. What are the safety and security issues?

It may well be argued that attainment of 100 per cent security is just like digging half a hole. One can imagine that when a ship has to load and unload its full load of 18,000 containers, how much can one achieve in securing the cargo? This becomes especially critical when the ship captain is anxious to get out of the port as quickly as possible. He knows that he earns money on the high seas and loses while in the port.

7. Who are the real beneficiaries?

Everyone who advocates bigger containerships concentrates on how much saving there would be in terms of capital and operating costs of these ships. No one yet knows for sure how many port costs would have to be incurred and how much the industry would have to bear which may offset the savings of the carriers. It is questionable whether the industry as a whole will be the gainer in real terms.

A critical review of the possible answers to the above questions gives conflicting signals. On the one hand are the pessimists who maintain that the claimed financial returns of bigger containerships are elusive if the overall transport costs are considered? On the other hand are those optimists who argue that the growth in the world trade and search for economies of scale is inexorable, and will drive the vessel to Malacca size. They say the constraints may be overcome by deploying them for shuttle service between the ports serving mega hinterland load centres.

At the end of the day, is there any one who can definitely give the answer to the question: 'What Next'? Most probably the Carriers could, but they have the golden rule of silence.

Are there any telltale signs? Maybe: COSCO gives us clues by trumpeting its new weekly service via the newly opened Fairview Terminal at Prince Rupert, the deepest port in Canada with 38 to 44 m in its approaches. It will shave four days off transit times from Yokohama to Chicago, the American hinterland load centre, to just 13 days. As compared to other ports on the North American west coast – Vancouver, Seattle, Los Angeles or Long Beach, this is the shortest transit time. Who knows what COSCO is thinking? The fact that Far-East trade has been mostly ocean borne does not mean that this is the only way such traffic can go. Canada, with its uncomplicated and extremely efficient one country transcontinental rail system, as well as its naturally deep water ports at both ends of the country, has the potential to provide an equally fast and cheap Land-bridge route. It's a total distance of about 10,000NM from Yokohama to Rotterdam via the Canadian Land-bridge against 11,000NM via the Suez Canal. On top of this, it connects the Midwest U.S. load centres to the burgeoning Asian production powerhouse.

COSCO may well be trying to have the best of the two worlds. COSCO Pacific announced on the 7th of November 2007 the acquisition of 20 per cent equity interest in the SCCT. Is it that this strategic port may be handy if and when Suez Canal is widened and deepened to accommodate these big boats? It should not be surprising to anyone if COSCO steals the show from Maersk.

Thus, there is no definite answer except speculation to the question 'What Next?' One thing, though, is clear. In the real world things are taken as they are and not as they should be. No one has yet succeeded in pushing back the tide. In recent times, containerisation has done so many things that defy logic. So, it should not be surprising if in the next decade one sees on the launching pad: MalaccaMax, the Mother of all Box Ships.

At the IAPH Durban Conference in 2003, this author's answer to the Port Authorities of the Hub Ports in his presentation 'The Containership How Big: A Port Authority's Dilemma' whether or not they should prepare themselves for the arrival of Suezmax under the same confusing picture as it is today for MalaccaMax was:

DO or DIE

In answer to the question whether or not the Suez Canal Authority should prepare itself for the MalaccaMax:

DO or you will miss the boat.

If you don't, the Pacific Ocean is ready to embrace her with its open deep heart.

ABOUT THE AUTHOR

Zia H. Rizvi has a Bachelor's degree in Civil Engineering (B.E.) from the University of Karachi (1952) and post-graduate degree in Hydraulic Engineering (DHE-Delft) from the Technological University of Delft, the Netherlands (1958), specializing in ports, harbours, inland waterways and coastal engineering.

During his 54 years of professional career, he has been involved in port development projects in Canada, Pakistan, Bangladesh, Indonesia, Thailand, the Philippines, Vietnam, Taiwan, Venezuela, Mexico, Barbados, Guinea-Bissau, Mauritania and Sri Lanka. In addition, he has visited major ports in China, Japan, Malaysia, the Netherlands, France, USA, UK, Oman and Iran on various missions, fellowships, conferences and/or invitations. He has more than two dozen papers on the subject of ports, harbours and inland waterways to his credit.

ENQUIRIES

Zia H. Rizvi, P.Eng
Consulting Engineer, Port & Harbour
2001-5 Concorde Place
Toronto
Ontario
Canada, M3C 3M8

Tel: +1 416 444 5013
Email: zrizvi@sympatico.ca