

TRIPLE-E VESSELS : Tonnage measurement and Suez Canal dues assessment.

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Container Vessels Evolution :

- In the last decades container vessels became larger carriers trying to achieve economics of scale by increasing its capacity and consequence the emergence the so called ,TRIPLE- E vessels :
- Energy efficiency.
- Economics of scale.
- Environmental Improvements.(Reducing co2 emission by 50% per TEU).

Larger Vessels

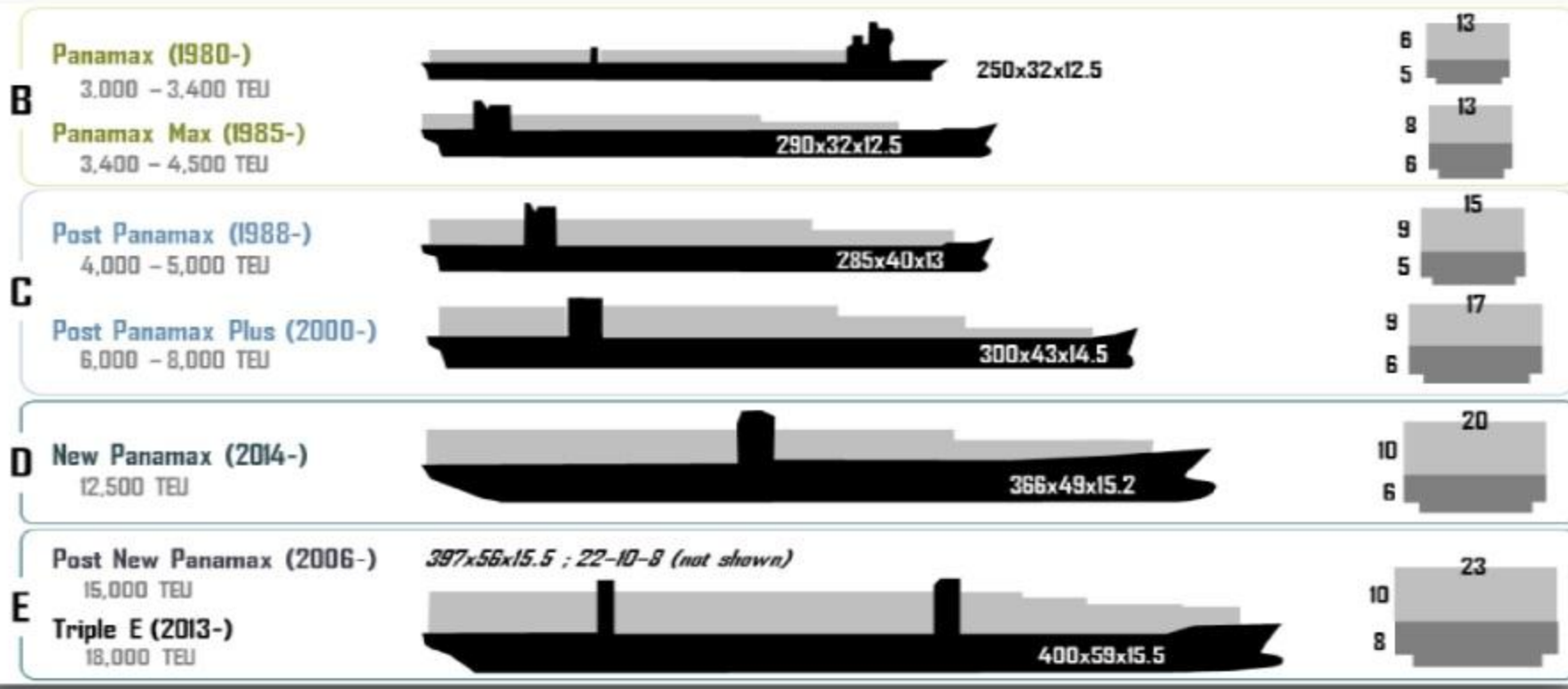


Figure no : 1

Big thinking

The capacity of a Triple-E vessel, 18,000 TEU, will set a new world record. Maersk Line continues to break its own records and sets new standards for the shipping industry. From Regina Mærsk to the Triple-E class, Maersk has designed the largest container vessels in the world since 1996.



2013
Triple-E Maersk Class
18.000 TEU



2006
Emma Mærsk Class
15.500 TEU



1997
Sovereign Mærsk class
8.100 TEU



1996
Regina Mærsk class
7.100 TEU

+16%

BREAKING THE RECORD (AGAIN)

18.000
20-foot containers



111 million
Pairs of sneakers

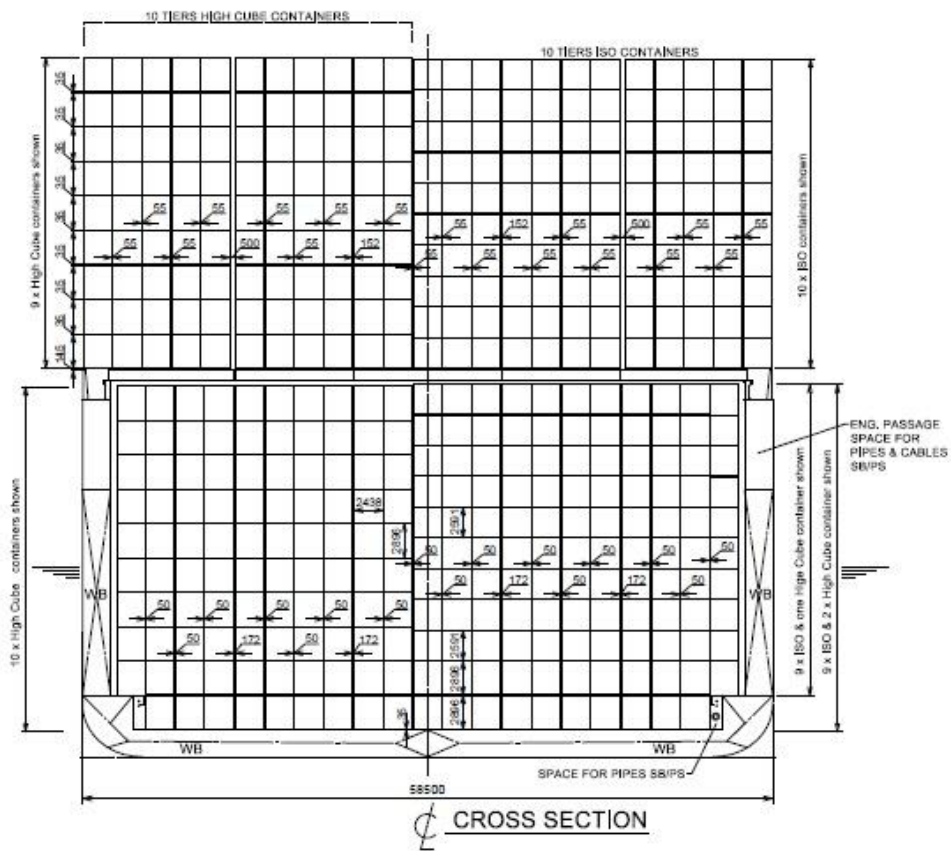


A single 20-foot container can hold about 6 thousand pairs of sneakers in one container. A Triple-E class vessel can transport approximately 111 million pairs of sneakers - enough to make everyone a jagger in Mexico.

Figure no : 2

Mid ship Section:

- TOP OF WHEELHOUSE 63400 A.B.
- NAV. BRIDGE 60600 A.B.
- H-DECK 57600 A.B.
- H-DECK 54600 A.B.
- G-DECK 51600 A.B.
- F-DECK 48600 A.B.
- E-DECK 45600 A.B.
- D-DECK 42600 A.B.
- C-DECK 39600 A.B.
- B-DECK 36600 A.B.
- A-DECK 33600 A.B.
- UPP. DK. 30200 A.B.
- 2'DK. 25468 A.B.
- 3'DK. 22572 A.B.
- 4'DK. 19676 A.B.
- 5'DK. 16780 A.B.
- 6'DK. 13884 A.B.
- 7'DK. 10988 A.B.
- 8'DK. 8092 A.B.
- 9'DK. 5196 A.B.
- T.T. 2300 A.B.



» Midship section.

Figure no : 3

Hull shapes of Emma Maersk and Triple- E Class :

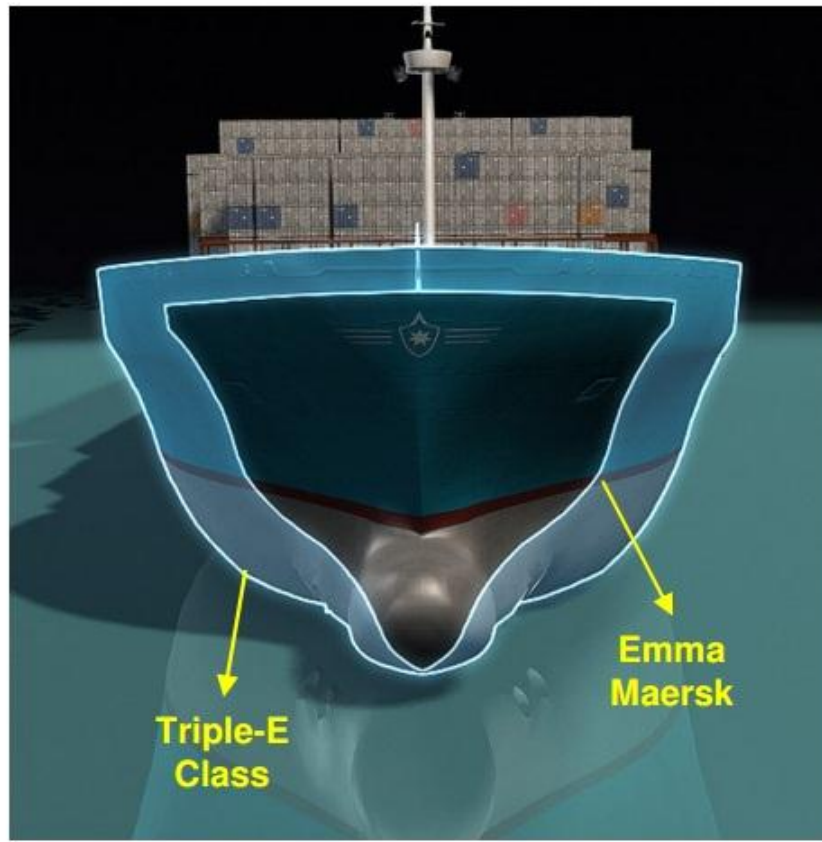


Figure no : 4

World container fleet development to 2014 .

Table no: 1

TEU Size range	In service today		On order 2011		On order 2012		On order 2013		On order 2014		On order 2015		Total on order	
	Ships	TEU	Ships	TEU	Ships	TEU	Ships	TEU	Ships	TEU	Ships	TEU	Ships	TEU
0-1,499	1,852	1,501,002	26	22,048	36	33,588	26	22,646	0	0	3	0	91	78,282
1,500-2,999	1,296	2,799,021	12	23,944	25	54,201	44	93,078	0	0	1	1,700	82	172,923
3,000-4,999	946	3,818,773	22	88,798	67	284,251	59	243,633	4	19,068	0	0	152	635,750
5,000-7,999	589	3,535,740	10	63,130	28	183,456	29	184,146	1	6,600	0	0	68	437,332
8,000-9,999	257	2,203,983	3	25,139	26	218,473	54	460,844	27	231,356	0	0	110	935,812
10,000-12,499	38	414,458	4	45,000	14	154,462	2	20,000	6	60,124	3	30,000	29	309,586
12,500-15,999	64	875,490	11	144,608	49	649,407	25	330,954	24	314,650	0	0	109	1,439,619
Over 16,000	0	0	0	0	6	96,000	5	90,000	8	144,000	7	126,000	26	456,000
Total	5,042	15,148,467	88	412,667	251	1,673,838	244	1,445,301	70	775,798	14	157,700	667	4,465,304

Table 5. Shipbuilding Statistics (Source: Containerisation International)

Technical specifications of TRIPLE-E Class .

Table no : 2

Length (m)	400
Beam (m)	59
Draft (m)	14.5
Tonnage	165,000 DWT
Max. Speed (knots)	23
Propulsion	Twin MAN engine – 43,000 hp each

Fleet Capacity

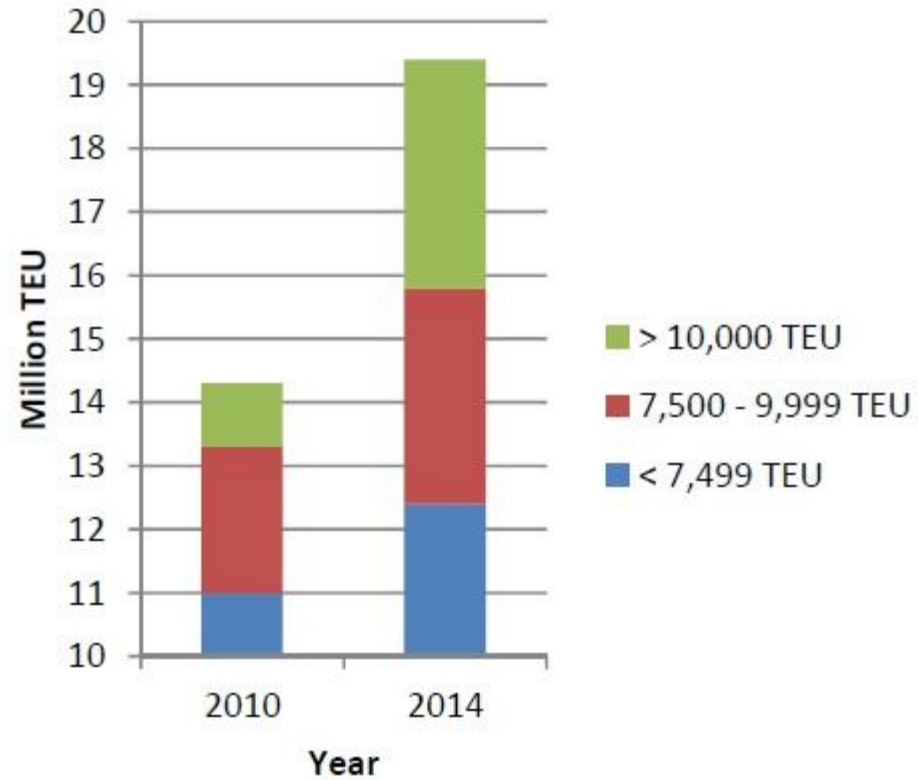


Figure no : 5

Problems Facing TRIPLE-E vessels:

- The greater outreach required to service the ship's extra row of containers will mean longer booms.
- The boom must be located at a greater height because of the height of the ship's container stacks .
- The wind force on the crane will be higher which has an impact on wheel loads .
- Longer vessels of 400 M will lead to more berth wastage to handle 18000 TEUs efficiently.
- The bigger the ship, the greater the cost of hours lost in port .

The importance of container ships in Suez Canal.

- The Suez Canal plays a pivotal role in today's global container shipping network for vessels sailing on the important ASIA-EUROPE trade lane.
- Container ships account for about 60% of Suez Canal total revenues .
- The number of TEUs transiting the Suez Canal are increasing :
 - 42.1 Million TEUS in 2014 .
 - 38.2 Million TEUs in 2013 .
 - 37.7 Million TEUs in 2012.

**Table No.(4) Number of container ships and its net tonnages
(2010- 2014)**

Year	No. of Container vessels	Container ships net tonnages (million tons)	Total net tonnages of ships in Suez Canal (Million Tons)	Ratio of net tonnage of container ships%
2010	6852	465.7	846.4	55
2011	7178	519.3	928.5	55.9
2012	6332	507.1	928.5	54.6
2013	6014	508.2	915.5	55.5
2014	6129	536.3	962.7	55.7

Source: Suez Canal Authority


**Table No.(5) Containerized Cargo in Suez Canal
(2010- 2014)**

Year	Containerized cargo (million tons)	Total Cargo (Million Tons)	Ratio of containerized Cargo %
2010	367.0	646.1	56.8
2011	397.2	691.8	57.4
2012	398.0	739.9	53.8
2013	406.1	754.5	53.8
2014	435.0	822.3	52.9

Source: Suez Canal Authority

Importance of tonnage in maritime world.

- The tonnage of a ship has become one of its defining characteristics
- All vessels are measured for assignment of national gross and net tonnages .
- Vessels intending to transit Suez Canal or Panama Canal are measured according to the rules of the respective canal authorities .
- Imo rules refer always to tonnage base to its laws.
- Harbor dues are depending on net or grosstonnage base .

- 
- Light house dues, pilot age dues ,dry dock dues ,and similar facilities thought the life of the vessel depends on its tonnage .
 - It is used also for statistics in maritime trade.

Evolution of tonnage measurement systems

- a-Moorsoom's system 1854 .
- b -Suez Canal rules 1873 :
- “The gross tonnage or total capacity of ships comprises the exact measurement of all spaces (without any exception) below the upper deck as well as all permanent covered and closed in erections on that deck” .
- c- Panama Canal admeasurements system.
- d -International convention on tonnage measurement of ships ,1969 .(ITC-69) .

Suez Canal transit dues of Triple-E Vessels.

The tonnage on which all dues and charges to be paid by vessels are assessed, is the net tonnage resulting from the system of measurement laid down by the international commission held in Constantinople in 1873, and duly entered, on the special tonnage certificate issued by the competent authorities in each country⁽¹³⁾.

The containers on upper deck are considered as closed in spaces increasing the carriage capacity of the ship when situated over the main deck⁽¹⁴⁾.

Tolls are calculated on the basis of Suez Canal net tonnage plus a Ratio specified for the number of tiers on the upper deck according to circular No. 3/2014 of Suez Canal are as follows:

Northbound Container Vessels:

4% for vessels carrying one tier.

6% for vessels carrying two tiers.

8% for vessels carrying three tiers.

11% for vessels carrying four tiers.

15% for vessels carrying five tiers.

21% for vessels carrying six tiers.

An increase of 2% shall be applied for each tier in excess of six tiers, which means that a surcharge of 23% shall be applied on vessels carrying seven tiers and 25% surcharge if vessels carrying 8 tiers...etc.:

South bound vessels, circular No. 2/2007 shall remain in force, for example container vessel carrying 8 tiers on deck shall pay 20% surcharge⁽¹⁵⁾.

Southbound container vessel:

2% for vessels carrying one tier.

4% for vessels carrying two tiers.

6% for vessels carrying three tiers.

8% for vessels carrying four tiers.

12% for vessels carrying five tiers.

16% for vessels carrying Six tiers.

18% for vessels carrying Seven tiers.

An increase of 2% shall be applied for each tier in excess of seven tiers, which means that a surcharge of 20% shall be applied on vessels carrying 8 tiers on deck....etc.

Table (6) TEU fees in Suez Canal

TEU Cost U.S. \$.	Utilization
<i>a- Triple- E Direction (Northbound):</i>	
67.5	76.0%
64.5	80.4%
58.8	88.9%
<i>b- Triple- E Direction (Southbound):</i>	
56.1	88.4%
55.1	86.0%
58.5	85.0%
<i>c- EMMA MAERSK Class (Southbound):</i>	
71.8	68.0%

TEU transport Cost through Suez Canal decrease, the higher the numbers of TEU can the ship carry.

Example:

Northbound transit:

Triple- E class transited the Canal from Suez its gross tonnage= 200532 tons.

Net tonnage= 180528 tons. Carrying 8 layers of containers on upper deck.

So additional dues 25% are taxed, plus extra dues for escorting tugs and pilots.

The total Canal dues were 932741 U.S \$. That means the transfer cost of TEU in Suez Canal is 64.4 U.S. \$. So the more TEU the ship carry the less cost are realized. Another triple- E class vessel's cost of TEU through the Suez Canal is 58.8 U.S \$.

Southbound Transit:

Cost of TEU transiting Suez Canal ranges between 56 and 59 U.S \$, according to the number containers the ship were transporting.

EMMA- MAERSK class vessel:

This type of container vessel capacity 15000 TEU, the cost of TEU for transiting Suez Canal was 71.8 U.S. \$ in case of 68% utilization.

9 Advantages granted to container vessels:

- Allow to the vessel carrying 10 TEUs on the higher tier without calculating it as tier.
- If protuberance part of open TEUs on the last tier exceeds half height of container, then consider one tier.
- If the ship carry empty containers only, then Suez Canal dues shall be calculated as ballast, provided that:
Containers carried belongs to the owner or charters.

Conclusions:

- Container vessels represent the bulk of the Suez Canal revenues.
- There is correlation between mega projects and economics of scale.
- Varying utilization of mega container ship affect the cost of TEU transiting Suez Canal.
- The slot cost increase for diminishing utilization.
- The importance of tonnage measurement of container ship in particular for its operating economics.
- The need to pay attention to the rules of tonnage measurement of ships in the maritime institutes and colleges of engineering (Departments of ship engineering).
- New Suez Canal will cut time of transiting, consequently affecting Triple- E economics by saving time.