

P r o c e e d i n g s  
16<sup>th</sup> IAMU Annual General Assembly  
Opatija, Croatia, 2015



Sveučilište u Rijeci  
Pomorski fakultet Rijeka  
University of Rijeka  
Faculty of Maritime  
Studies Rijeka



**IAMU**

International Association of Maritime Universities

---

## ANALYSIS OF EFFECTIVENESS OF 18,300 TEU ULCC SERVICE ON THE FAR EAST – BALTIC ROUTE

Laczynski, Bogumil\* ; Laczynski, Tomasz

Gdynia Maritime University  
Poland

---

**Abstract.** Paper contains analyze of dynamic market of ULCC, new shipping lines, new services, destinations and partners and port technologies. Statistics, information and statements for December 2014. In 2014 around 15,4 million TeU was transported on Far East – Europe route. EVERGREEN ordered 11 ULCC vessels apr. 20,000 TeU each. Actually the biggest container vessel in the world is MSC OSCAR, which can carry 19,224 TeU. Strategic goals of Port of Gdansk is to gain the rank of distribution port and Baltic container hub. The port's full potential was duly recognized as the Trans-European Transport Corridor No.6 was delineated to provide a connection between the Nordic countries and Southern Europe (Adriatic), with the Gdansk port ranking among its major links. The existing potential of its two container terminals (i.e. Gdansk Container Terminal in the Inner Port and Deepwater Container Terminal Gdansk DCT) currently ensures the throughput capacity of 1,200,000 TeU's and will be further expanded over the coming years. The expansion potential at DCT Gdansk is estimated to reach up to 4 million TeU's. Service of 18300 TeU Maersk's vessel in weekly service with ports of Far East. Plan of developing of port and building DCT2 (650 meters of berth, 16.5 meters draft and new Superpostpanamax Cranes STS produced by Liebherr Container Cranes Ltd, as well as 16 RTG gantries. ). New investments value 290€ billion give to new terminal possibility of developing to 4 million TeU a year. New terminal will be ready to mooring first ULCC in October 2016.

**Key words:** ULCC, container terminal, TeU, DCT

**\*Corresponding author**

Mobile: +48 601 61 66 61

Fax: +48 58 620 97 15

e-mail: [acamars@gd.pl](mailto:acamars@gd.pl)

## 1 INTRODUCTION

In Gdansk Bay are located 2 big ports: Gdansk and Gdynia in which there are 4 container terminals:

1. BCT – Baltic Container Terminal
2. GCT – Gdynia Container Terminal
3. GTK – Gdansk Container Terminal

and

4. DCT – Deepwater Container Terminal

DCT is the newest and having practically unlimited potential for expansion up to 4 million TeU capacity in next 2 years. In August 2013 new Maersk 18270 TeU container carrier (Maersk Mc-Kinley Moller) opened regular weekly service from Far East to Poland. Diagram 1 shows tendention of develop of DCT from first year of existing up to moment of Maersk Service establishing from 2013.

## 2 CHARACTERISTIC OF DEEPWATER CONTAINER TERMINAL

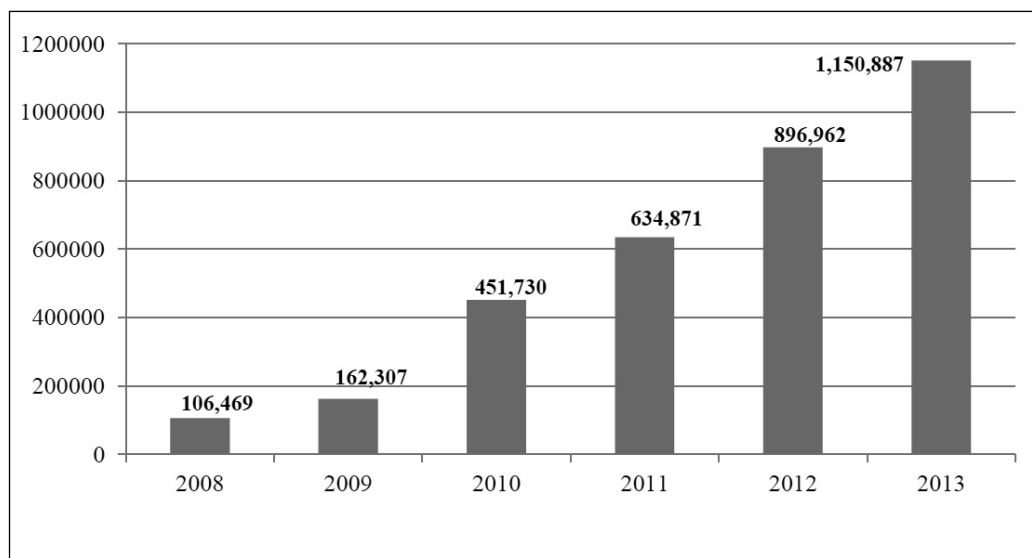
DCT handles import, export and transshipment containers to/from mainline and feeder vessels, trains, CFS and road transport. Even though DCT is not an automated terminal all the machinery that is available in the terminal is really new due to the short life of it. The distribution of the yard is not random and every place is assigned to different containers to fully optimize the stevedores and yard workers Job (Figure 1).

The terminal equipment is listed in Table 1 .

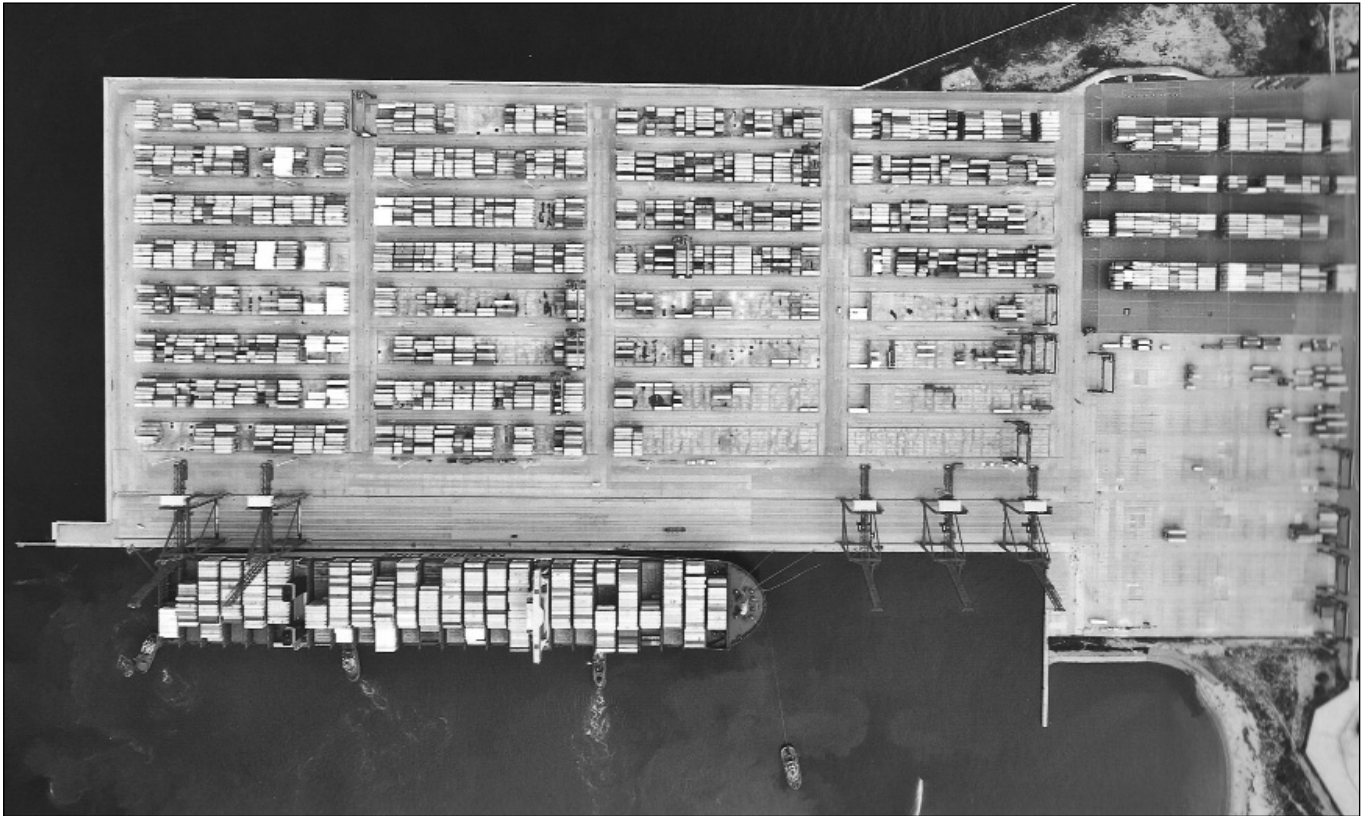
**Table 1** DCT data information

Terminal area	44 ha
Operating quay length	650 m
Berth depth	16.5 m
Warehouse with mobile reloading ramps	7,200 m <sup>2</sup>
Storage capacity	26,000 TEU
Post-Panamax ship-to-shore (STS) cranes	5 x 58 t
Rubber-tyred gantry (RTG) cranes	17 x 40.6 t
Terminal tractors	35
Reach-stackers	4 x 32 t
Empty container stackers	2
Rail siding	4 rails track of combined length of 4 km
Stations for refrigerated containers	336
Pre-gate parking area	100 lorries
Annual throughput capacity	1,250,000 TEU
Annual train capacity	760,000 TEU
Terminal Operating System	Navis

Terminal operating system called *Navis* connects all computers in the office, cranes, in short, all the devices and machinery. DCT Gdansk has a yield of 30 movements per hour. DCT Gdansk has its own stevedores working for 24 hours with 2 supervisors and 2 teams with different number of person.



**Diagram 1** Annual container throughput growth at DCT, from 2008 to 2013 in TeU's (source: inner publication of DCT Gdansk)



**Figure 1** Maersk ULCC mooring in DCT (Dec. 2014)

### 3 WHY GDANSK ?

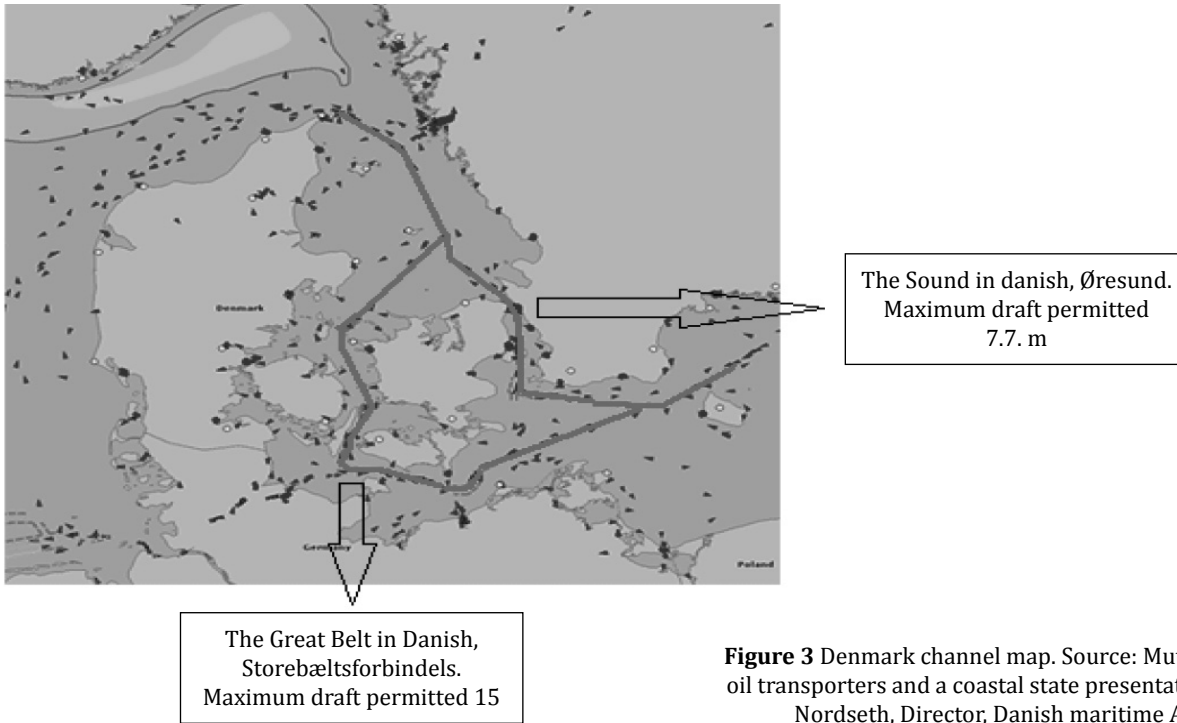
The following picture (Figure 2) shows the ports that have enough depth in the North European Coast, from France to Poland, to harbor the largest container vessels that have around 14-15 meters draft or even more. It is important to remember the UKL concept, under keel clearance, that must be 10% of the draft. It is not a nonsense because even all the information that we have nowadays, hundreds of groundings are registered every year some of which have finished with duties. First of all, Maersk is always looking for increase its own business. As already cited before, Maersk is operating AE 10 route with the largest container vessels in the world. For example, the largest vessels, EEE class, have a length of 400 m, 59 meter breadth and a draft of 15 meters, that means that these kind of vessels are limited by their dimensions. Not all the ports can host these enormous ships. The most typical limitation is the draft, ports are not deep enough.

Even if we follow searching a port capable to handle these enormous vessels on the south Baltic Sea coast is impossible to find one. DCT Gdansk is the only terminal that can do it along the coastline. It is important to say that Baltic Sea has a maximum draught permitted of 15 meters because there are zones with 16.5 meter deep and the UKL, under keel clearance has to be 10%. This zone is the entrance to the Baltic Sea between



**Figure 2** The Gdansk – Le Havre Range and the ULCV Ultra-Large Container Vessels Map. Source: Google images

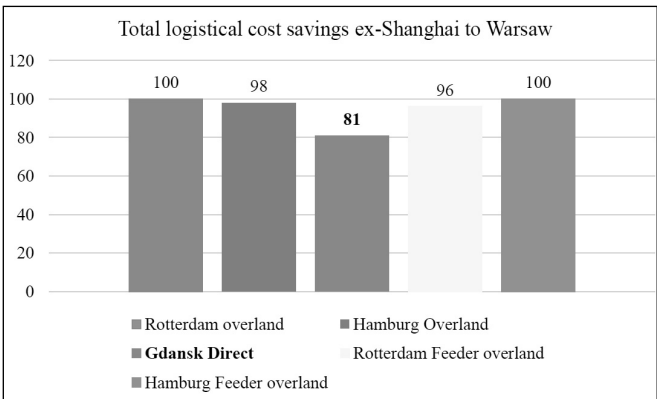
Denmark and Sweden in the Great Belt (Figure 3). As a curiosity we can mention that apart from the limited draft in the Great Belt, vessels have to cross down the Great Belt Bridge that has 65 meters clearance below. EEE Maersk class vessels are around 58 meters high from the waterline, of course depending on the quantity of load. That means that clearance between the bridge and the top of the vessel are only 7 meters. (Figure 4) Secondly, DCT Gdansk is an easily accessible port facility that connects Asia with the emerging mar-



**Figure 3** Denmark channel map. Source: Mutual concerns of oil transporters and a coastal state presentation by Andreas Nordseth, Director, Danish maritime Authority



**Figure 4** Maersk vessel under GBB. Source: Google images

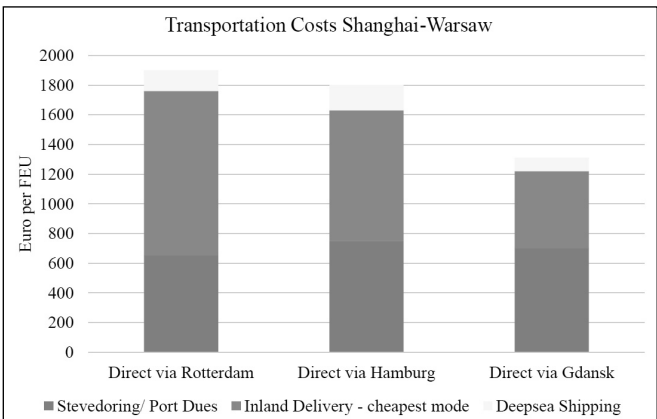


**Diagram 2** Saving graphic. Source: Ocean Shipping Consultants Ltd "Shipping Cost Study" September 2011

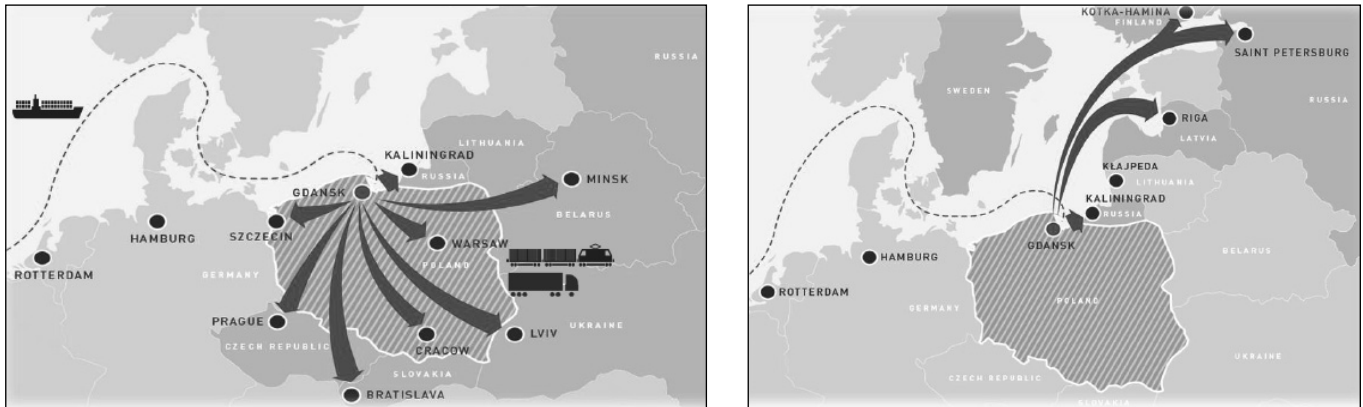
kets of Central and Eastern Europe. We checked that the closer by sea the cheaper. The graphics above show economic aspects of container traffic between the Far East and Poland, By way of example, in this case was chosen Shanghai, China to Warsaw central Poland.

The first graphic (Diagram 2) shows us the cost per FEU. While transport via Rotterdam or Hamburg costs are around 1800 €, via Gdansk costs are less than 1400 € per FEU. Stevedoring/Port duties and deepsea shipping costs are more or less the same for all routes but, we find the savings in the inland delivery, confirming the closer the cheaper.

In the second (Diagram 3) graphic we can see that the most expensive methods are the ones that more use land transport. Saving less than 5% using feeder services and saving around 20% going directly via Gdansk.



**Diagram 3** Cost graphic. Source: Ocean Shipping Consultants Ltd "Shipping Cost Study" September 2011



**Figure 5** Importance of hub of Gdansk for East Europe delivering

Every week from Wednesday late afternoon till Saturday morning DCT discharges and loads approx. 9000 TEU. Most probably importance of hub of Gdansk will systematically increase due to transit containers to East European Countries (figure 5).

#### 4 MAERSK TRIPLE-E CLASS VESSELS

The Maersk Triple E class is a family of large, fuel-efficient container ships, designed as a successor to the Maersk E-class due to capacity is 16 % greater, with a maximum of 18,270 TEU (figure 6). The vessel is to be built in general as a double-skinned construction with 11 cargo holds, 24 bays holding 40 feet containers and 21 hatches. Containers on deck are generally to be carried in 23 rows and up to 10 tiers. A three-tier lashing bridge is to be installed on the upper deck. The name "Triple E" is derived from the class's three design principles: Economy of scale, energy efficient and environmentally improved. Apart from being the world's longest ships in service, are expected to be the most efficient container vessels per TEU of cargo.

The ships are 399 meters long and 59 meters wide. While only 2 meters longer and 3 meters wider than E-class ships, the Triple-E ships will be able to carry 2,500 more containers due to an additional row of containers has been added, giving it 23 rows across its width, compared to 22 rows on board E-Class. With a draft of 14.5 metres, they are too deep to use any port in the Americas or cross the Panama Canal, but are able to transit the Suez Canal when sailing between Europe and Asia (Table 2).

One of the class's main design features are the dual 32 megawatts (43,000 horse power) ultra-long stroke two-stroke diesel engines, driving two propellers at a design speed of 19 knots. Slower than its predecessors, this class uses a strategy known as slow steaming, which is expected to lower fuel consumption by 37% and carbon dioxide emissions per container by 50%.

Five generators sets will provide 19,200 kilowatts of electric power and two 3,000 kilowatts shaft generators can convert main engine propulsion power into electricity, when the ship is steaming at sea. The hull of the Triple-E is more like a U-shape compared to traditional container ships. The more spacious hull and extra row provides additional capacity and with the more forward navigation bridge, containers can be stacked higher in front of the bridge without losing visibility. In addition to that, more containers fill the space behind the bridge above deck and below deck, using the space created by the engine room's position further to the back of the vessel.

#### Main particulars of Maersk vessel

- Capacity: 18,270 TEU
- Reefer Capacity: 600 plugs
- Length: 399 metres
- Beam: 59 metres
- Draft: 14.5 metres
- Height: 73 metres (above baseline)
- Height: 58.5 metres (above waterline)
- Top Speed: 23 knots
- Optimum speed: 19 Knots
- Shipyard: Daewoo Shipbuilding
- Owner: A.P Moller Maersk Group
- Cost: \$190 millions
- Deadweight: 192,800 metric tonnes

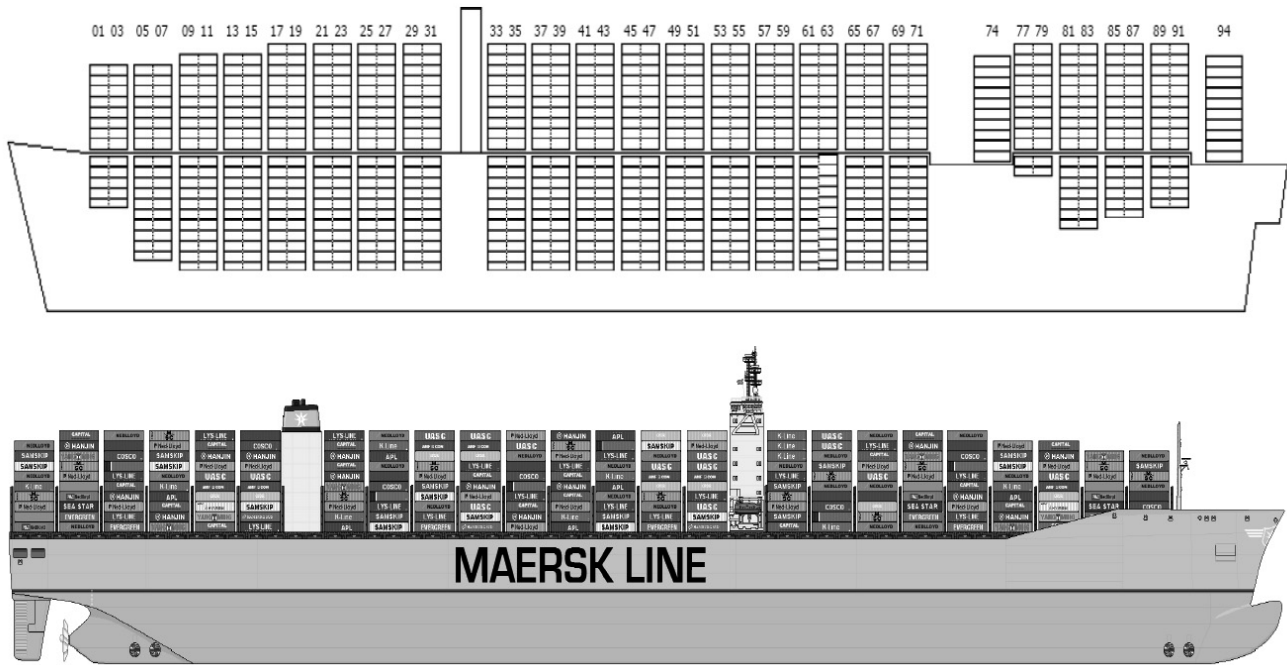


Figure 6 18,270 TeU Maersk ULCC

Table 2 List of Maersk ULCC vessels

Ship	IMO Number
Maersk Mc-Kinney Moller	9619907
Majestic Maersk	9619919
Mary Maersk	9619921
Marie Maersk	9619933
Madison Maersk	9619945
Magleby Maersk	9619957
Maribo Maersk	9619969
Marstal Maersk	9619971
Matz Maersk	9619983
Mayview Maersk	9619995

**Asia – Europe service (AE-10)**

The Triple-E class vessels are doing the AE-10 Asia-Europe-Baltic loop of Maersk Line with frequently calls at Gdansk. Port selection is a key point in the discussion of such large capacity vessels and Gdansk has long been a Maersk port with the strong economy of Poland to back it up.

The ports included in this 42 days service are: Gdansk (Poland), Aarhus (Denmark), Gothenburg (Sweden), Bremerhaven (Germany), Rotterdam (Netherlands), Port Tangier (Morocco), Algeciras (Spain), Suez Canal (Egypt), Tanjung Pelepas

(Malaysia), Singapore (Singapore), Yantian (China), Hong Kong (Hong Kong), Busan (Korea), Kwangyang (Korea) Ningbo (China), Shanghai (China) (figure 7 & figure 8)

It should be noted that some ports are achieved only in one way, e.g. Tangier Port is only called on the way from Europe to Asia and not from Asia to Europe. Another case could be Tanjung Pelepas in Malaysia, Singapore or Hong Kong as well. It is true that depending of the demand, some ports can be omitted on the way. As we can see in the following maps, some ports do not appear (Algeciras in Spain) due to that not every time are called.

**5 NEW TERMINAL DCT2**

On May 15th 2015 Construction of the second deep-water berth in DCT Gdansk (T2) became a fact. Completion of this project with an investment amounting to EUR 200 million, which is financed by the consortium of 7 banks, is scheduled for the third quarter of 2016.

DCT 2 will be ready within 19 months. Belgian N.V. BESIX – the general contractor and the designer of the new facility, will finish construction in August 2016, what will give an opportunity to operate 3 million container per year. New berth 650 meters long with depth of 16,5 meters is preparing for 24,000 TeU vessels. New Five cranes will allow to load/discharge 25 rows of containers (ULCC 24,000 TeU).

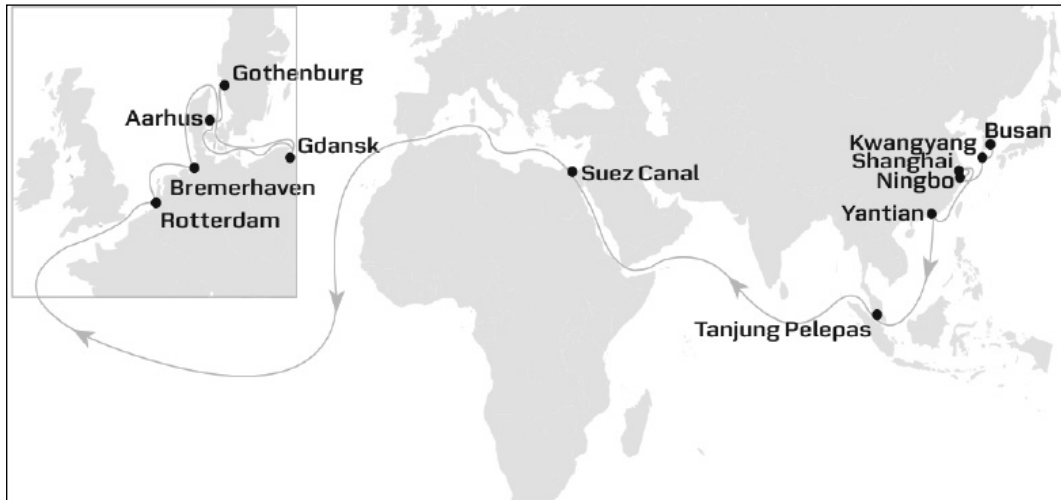


Figure 7 Asia - Europe (AE-10) - Westbound service. (Source: Maersk)

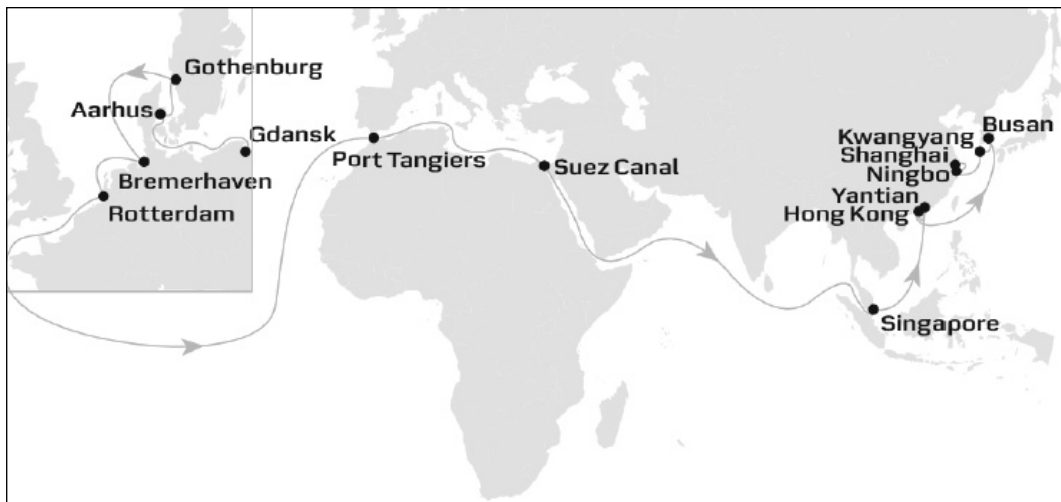


Figure 8 Asia - Europe (AE-10) - Eastbound service. (Source: Maersk)



Figure 9 Representation of future distribution. Source: DCT: Poland's Maritime Window on the World



Figure 10 DCT development plans location. Source: DCT: Poland’s Maritime Window on the World

## 6 APPROACHING OF DCT

Faculty of Navigation of Gdynia Maritime University developed and finally proposed new system of approaching port of Gdansk addressed for the vessels with draft 15 meters and more. Every student of GMU trains on Transas Navi-sailor 5000 as one of the obliga-

tory exercise. Please find below two maps presenting approaching to DCT (Figure 11 and Figure 12) and final stage of maneuvering exercise to approach turning circle in DCT terminal.

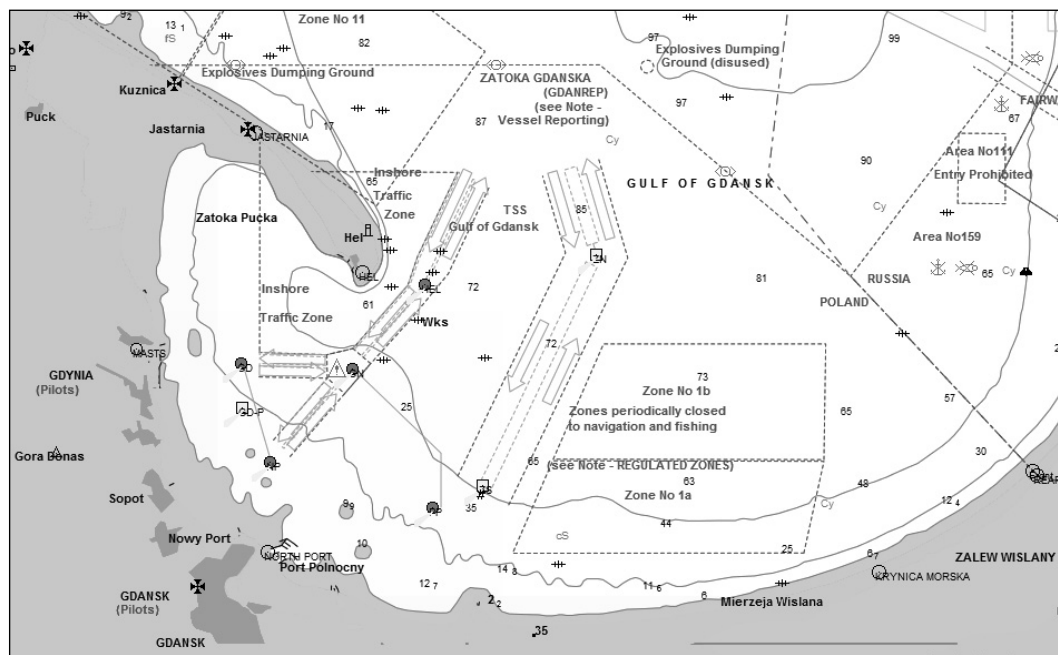


Figure 11 System, of approaching ports Gdansk and Gdynia invented by Gdynia Maritime University



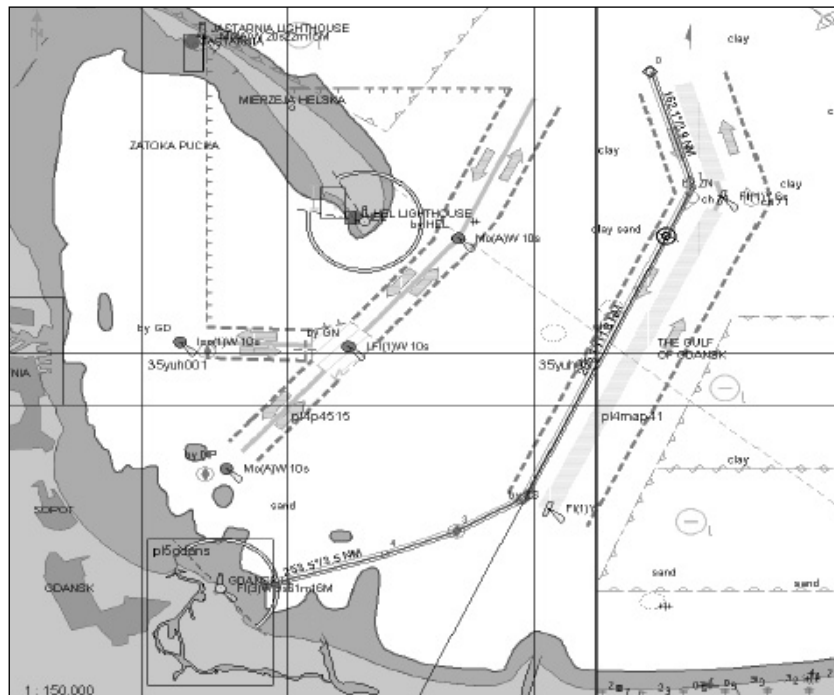


Figure 12 Traffic separation scheme as an element of route to DCT

## 7 CONCLUSION

In the near future will come into operation 49 mega-container vessels (Ultra Large Container Vessel – ULCV), with a capacity of 18 thousand TEU and more – English portal Vesselsvalue.com calculated. The total value of the contracts is estimated at 7.83 billion USD. This means that the total increase in capacity of the world container fleet will reach 913 300 TEUs. The biggest backlog is Maersk Line, which intends to pick up the 20 container ULCV. Further, the size of container ships ordered such owners as UASC (6 vessels), China Shipping (5 ships) and MSC (3 vessels). In addition, 6 ULCV container will go to China, Bank of Communications, with a further 6 to Scorpio Ship Management. According to experts the container market, at least 3 of them will be sailed on charter MSC.

There are many indications that the first container ship with a capacity of 20,000 TEU built in the shipyard Imabari Shipbuilding in Japan, and the operator will be Taiwan's Evergreen shipowner. Count series has 11 vessels of this type. Unofficially, he says that the container be created for the Japanese Kisen Kaisha Shoen owner and charter Evergreen them.

In the South Korean shipyard Daewoo Shipbuilding and Marine Engineering named currently the world's largest container ship MSC OSCAR, with a capacity of 19.2 thousand TEU, which will sail in the colors of the

Italian shipowner Mediterranean Shipping Company (MSC). The next ship of the MSC series OLIVER, the company will receive in March this year. At the beginning of December last year record in this category was CSCL container GLOBE, Chinese shipowner China Shipping, with a capacity of 19.1 thousand TEU. CMA CGM ordered the South Korean shipyard Hanjin Heavy Industries 3 container ships with a capacity of 20.6 TEU for delivery in 2017.

## REFERENCES

- [1] General Presentation (2013). Deepwater Container Terminal Gdansk.
- [2] Grabowski, J. Personal interview, 12<sup>th</sup> of December 2013. Operations Director Deputy. Deepwater Container Terminal Gdansk.
- [3] Skelnik, J. (2012). *Factors determining future of the Port of Gdansk*. Port of Gdansk Authority SA.
- [4] *Terminal Information Handbook*. (2013). Port of Gdansk Cargo Logistics SA.
- [5] <http://mangoworldmagazine.blogspot.com/2013/06/maersk-names-triple-e-after-maersk.html>
- [6] <http://www.maersk.com/>
- [7] <http://www.umgdy.gov.pl/>
- [8] <http://www.lloydlist.com/>