

# Port Logistics- Challenges of the Future

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The port of Hamburg, one of the world's ten largest container ports, is the most important hub for cargo traffic between East Asia and northern/eastern Europe and the leading German port by far; in Europe it ranks second only to Rotterdam in container traffic. In 2006 seaborne cargo volumes reached around 135 million t. Due to its geographical location far inland, Hamburg offers immediate natural port site advantages. By using the Elbe as a sea-river, efficient ocean cargo traffic can travel as far as 130 km deep inland. There is no need to resort to land transport, which is both much more expensive and environmentally damaging. The Kiel Canal as the shortest sea route links Hamburg with the countries bordering the Baltic Sea, including Russia. Other markets in central Europe are served from Hamburg by hinterland rail transport, which is unbeatable in terms of frequency, speed and reliability compared with rivaling North-range ports.

Consequently the port's future prospects are rated as positive. Container handling had already doubled to 8.9m TEU between 2000 and 2006. The prognosis for the period from 2007 to 2015 foresees a doubling of container handling volumes to at least 18m TEU.

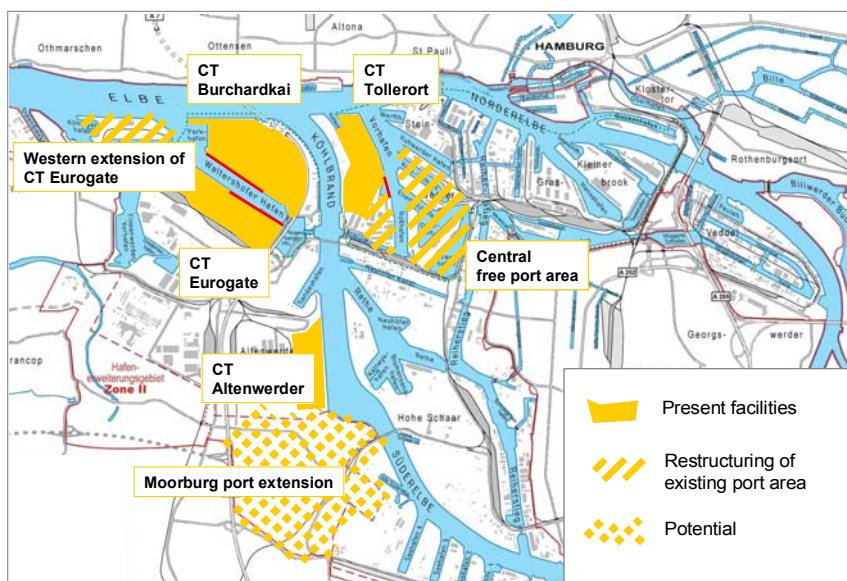
This development will pose huge future challenges such as:

- Coping with growing cargo throughput rates despite limited availability of port areas
- Ensuring sufficient water depths and at the same time taking into account long-term sustainability aspects
- Optimising the coordination of the individual modes of transport on waterways, by rail and on roads

Hamburg will meet these challenges with a coordinated expansion programme of existing container handling as well as logistics and transport infrastructure capacities.

In order to be able to handle the expected and forecasted growth in container throughput, Hamburg has to adapt and extend its existing handling facilities. Figure 1 shows the planned capacity extensions of existing handling facilities and the planned redevelopment of the central free port area.

The commissioning of the Altenwerder container terminal (CTA) provided Hamburg with one of the world's most modern container terminals. Right now it has with its four efficient berths for super-size ships, a highly productive handling system with largely automated operating procedures and excellent connections to hinterland carriers a handling capacity of around 3m TEU p.a. With a northern extension to accommodate a 5th berth capacities could be increased.



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**Figure 1. Port of Hamburg - Container Terminals**

The capacity of the Burchardkai container terminal was initially increased in 1999, when berth 1 at the Waltershof harbour quayside was completed. This is now being extended westwards, incorporating the outdated existing berths 3 to 6. With its total length of 1,470m, the Waltershof harbour quayside will allow simultaneous handling of four large container ships with post-Panamax container gantries. In addition the terminal operator is changing the whole terminal layout and restructuring handling facilities so that after the terminal expansion has been completed, its total capacity will be around 5.2m TEU.

Since the beginning of the 1990s, the Eurogate container terminal has been modernised in several phases. This included the infilling of Griesenwerder harbour and the construction of 1,095m of quay walls. During the next construction phase the old existing berths 1 to 4 will be extended to a total length of 1,035m. This will provide three efficient berths to handle the latest generation of container ships. After completion of the expansion in 2009, the terminal will offer a total handling capacity of 4m TEU. The western extension of the Eurogate terminal, inclusive of the restructured petroleum port area, is expected to offer additional capacities for around 2m TEU.

To expand the capacity of the Tollerort container terminal it is planned to extend the Europakai southwards to Hachmannkai. This will make available one extra berth for large container ships. During the last years the infilling of the Vulkanhafen and Kohlenschiffhafen harbour basins have provided additional operating and container storage area. These infrastructure measures will increase Tollerort terminal's annual handling capacity to around 2 million TEU by about 2012.

Extra handling capacities of around 3.5 million TEU are to be created in the central free port area by 2015 (Steinwerder container terminal). In order to make use of these capacities, major redevelopment of the whole area must take place. Development projects like these usually require the relocation of port users and port operators as well as more intensive use of already occupied sites. Establishing business support for these plans takes a lot of careful negotiating as the interests of all parties involved must be taken into account; the interests of the companies to be relocated and the interests of third parties affected.

One key factor of capacity extension is the further adjustment of the Lower and Outer Elbe to the new ship sizes which will have to be carried out within the next few years. At the moment shipping companies that serve Hamburg and deploy ships with a capacity of more than 8,000 TEU are subjected to tidal restrictions. After the river channel adjustments ships with a draught of up to 13.50m (in salt water) will be able to serve Hamburg without tidal restriction and ships up to a draught of 14.50m can call the port dependent on tides.

The expected growth in cargo throughput and the resulting increase in shipping traffic is a further strategic challenge for the future. There is a conflict of objectives in that available water surfaces cannot increase as fast as the increase in shipping traffic would require.

To provide an efficient operational and organisational structure within the port in the future too, the Hamburg Port Authority in collaboration with the Institute of Shipping Economics and Logistics (ISL) in Bremen have developed a simulation programme to simulate vessel traffic to and within the port of Hamburg.

The programme is an instrument to simulate future scenarios. Evaluation options are, for instance sensitivity analyses with different prognoses data, e.g. cargo handling, ship calls, ship development etc. It can also be used to evaluate alternative extension or capacity scenarios and their consequences on shipping traffic. Another possible application is the simulation of traffic management strategies.

Beside this simulation model for future developments, the HPA uses the ship handling simulator to review planning on waterways, the port basin and turning circles from a nautical point of view. The latest example is the planning layout of the Steinwerder container terminal which was reviewed using the instrument of the ship handling simulator. This instrument is also used for training harbour pilots and VTS-personnel and developing improved manoeuvre strategies to ensure efficient ship handling within the port.

To improve the existing processes, from ship call to ship departure, the parties involved have established a work group with the objective of enhancing the information flow within several processes, such as planning of berth allocation, planning and performance of ship calls, ship clearance, and planning and performance of ship departures. If disruptions in the ship's calling schedule occur, e.g. delay of upcomer or delay of dispatching, and the berth is not available, all subsequent logistic processes are affected. The overall objective is to implement an information platform where all information can be exchanged automatically and electronically so that appropriate action can be taken fast.

To meet the demands of safety and security in addition to efficient organisation, Hamburg established the designated authority "DA Hafensicherheit Hamburg" in 2004 as a consequence of the implementation of the International Ship and Port Facility Security Code (ISPS-Code). It consists of staff members of the Port Office and the water police and is managed by the Ministry of the Interior. The cooperation between the terminals/organisation is good, and the DA Hafensicherheit Hamburg on the one hand ensures high security and safety standards and on the other hand enables efficient handling of ships in the port.

In the next decade there will be a lot of strategic challenges that will require special attention. The port of Hamburg is well positioned to meet these challenges and to ensure that operations in the port run smoothly and safely in the future too.

*Wolfgang Hurtienne, born 1952, graduated 1981 from the Technical University of Braunschweig, Germany, with degrees in Mechanical and Civil Engineering. He then started his professional career in the field of port planning in Hamburg. After several managerial positions he heads today the division Port Planning, responsible for e. g. strategic port development, terminal development and restructuring concepts.*