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The Port of Hamburg

By MICHAEL BÖLTING et al.

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1. Location

The geographical position of the Port of Hamburg deep inland is a valuable natural location advantage. It allows seaborne traffic to travel approx. 130 km into the hinterland via the river Elbe without needing expensive overland transport, thus protecting the environ-



Fig. 1: The location of the Port of Hamburg

ment. The fact that railway transport covers more than 70 % of transport services to further hinterland destinations (> 150 km) shows just how environmentally-friendly it is to route cargo via Hamburg. Moreover, the port is closely linked via the River Elbe and the Kiel Canal to the expanding markets around the Baltic Sea, including Russia.

2. Key Data

2.1 Cargo Handling

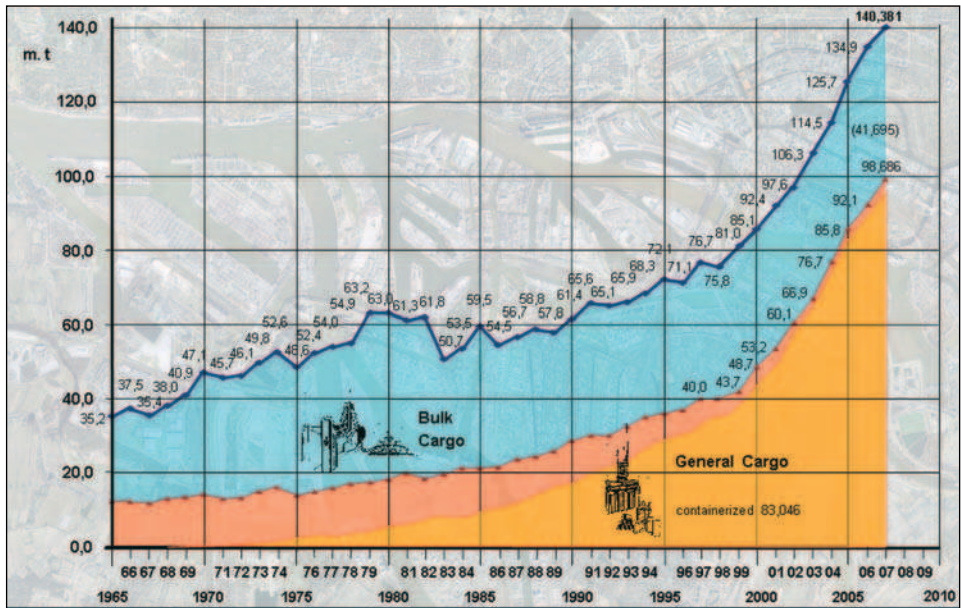


Fig. 2: Total cargo turnover 1965–2007

2.2 Hinterland Traffic

Table 1: Inland waterway traffic¹

	1980	1990	2000	2004	2005	2006	2007
Total cargo (in million tons)	11.1	9.0	9.8	9.0	11.2	10.5	12.0
No. of ships (x 1,000)	19.0	12.9	11.1	9.7	11.2	10.2	11.2
Tonnage (in million tons)	13.8	11.4	11.4	10.6	12.2	11.3	13.8

¹ Source: Statistik Nord

Table 2: Port railway

	1980	1990	2000	2006	2007
Volume of traffic (in million tons)	24.1	21.9	24.2	38.9	39.7
Containers (TEU x 1,000)	n. s.	512.2	780.0	1587.8	1801.6
Incoming and outgoing wagons (x 1,000)	1498.3	1198.3	1003.0	1543.9	1585.2

2.3 Port area

Total port area	7,236 ha
a) land area	4,249 ha
b) water area	2,987 ha
Utilised port area	6,403 ha
a) land area	3,416 ha
b) water area	2,987 ha
Available port area	1,634 ha
Port extension area	833 ha

2.4 Water Levels and Fairway Depths

Tidal elevation at the tidal gauge Hamburg-St. Pauli

(Mean values for 2001 to 2005)

Mean high water	M.S.L. + 2.10 m
Mean low water	M.S.L. - 1.53 m
Mean tidal range	3.63 m

Max permissible draught²

Incoming vessels using high tide	15.10 m
Outgoing vessels riding on the tidal wave	13.80 m
Independent of tide, incoming/outgoing	12.80 m

Bottom of deepest berth	M.S.L. - 17.00 m
-------------------------	------------------

3. The Port's Contribution to the City's Economy

The port has always made a very important contribution to employment and the creation of value in Hamburg and the surrounding region. The number of jobs which depend directly and indirectly on the port rose between 2001 and 2006 by around 18,000 to 163,000.

² Data for freshwater

The port's contribution to the City of Hamburg's gross domestic product (GDP) has risen to € 12.4 billion, which is equivalent to 14.4 % of the total GDP. The income tax and corporate tax that the port generates for the city has risen from approx. € 586 million (2001) to € 883 million (2006). In 2006, 12.7 % of Hamburg's total tax revenue was generated by the port.

It is anticipated that the port will continue to drive employment and create more jobs. By 2012, the companies that operate in the seaport intend to return around 2,900 long-term unemployed persons back to the labour market. The expansion of facilities at the two largest container terminals will create around 1,800 additional jobs. By 2015, up to 14,000 new jobs will be created in Hamburg's logistics sector. This kind of employment boom would be impossible without the seaport and globalisation. Port-related tax revenue will continue to rise and could reach € 1,089 million by the year 2015.

4. The Port's Spatial Structure Development

The modern Port's History started in 1866 when operations at the first modern facility, the Sandtorkai, began. On a length of almost 700 metres, the new Sandtorkai featured quay sheds, 14 metres in width, open on the water side and equipped with ramps. In line with the most advanced technological standard of the era, the quay area was equipped with 16 rotating, steam-powered cranes on rails. The use of this quay as a transshipment point was a revolutionary departure from the traditional method of unloading and loading freighters at moorings in the middle of a harbour. The new facility combined all forms of land and water transport at one site and enabled immediate transshipment and fast sorting of cargo for forwarding. The resulting time savings were enormous. Rail tracks and an access road on the quay ensured a direct link to the land transport.

The Sandtorhafen model would be used as a basis for designing and equipping subsequent harbour basins. After the possibilities for expansion along the right bank of the Elbe adjacent to the city had been exhausted, the systematic construction of the port complex on the left bank of the Elbe began in 1888. The expansion was quickly followed with tremendous "technical energy" by the transformation of the natural landscape into a port complex. The structural element of the Hamburg pier, an innovation that had been tried and tested, was adopted and perfected in terms of its dimensions, equipment and connections. The typical Hamburg port structure was characterized by narrow piers laid out like the fingers of a hand and protruding out towards the Elbe fairway. Following the increase in container transport volumes in the early 70s, the original land structures were no longer capable of meeting the requirements of modern maritime transshipment. While utilisation of hitherto unused areas to the West of the Köhlbrand enabled container traffic to grow dynamically, in 1974 the first restructuring project in the eastern part of the harbour introduced the concept for sustainable land development by filling in entire harbour basins. Since then, there has been a fundamental structural change in the port area. During the last 30 years, the layout of the port has been changed completely from East to West in order to maximize production levels in the existing port. Exploiting the potential of land already in use has provided an ideal infrastructural basis for development. As a result, the port enterprises have been able to use state-of-the-art equipment to obtain high productivity gains at the terminals. In fact, their efforts have made the Port of Hamburg one of the world's top 10 container ports. This consistent reuse of industrial port areas is, in terms of its scope and commercial success, an unrivalled example of

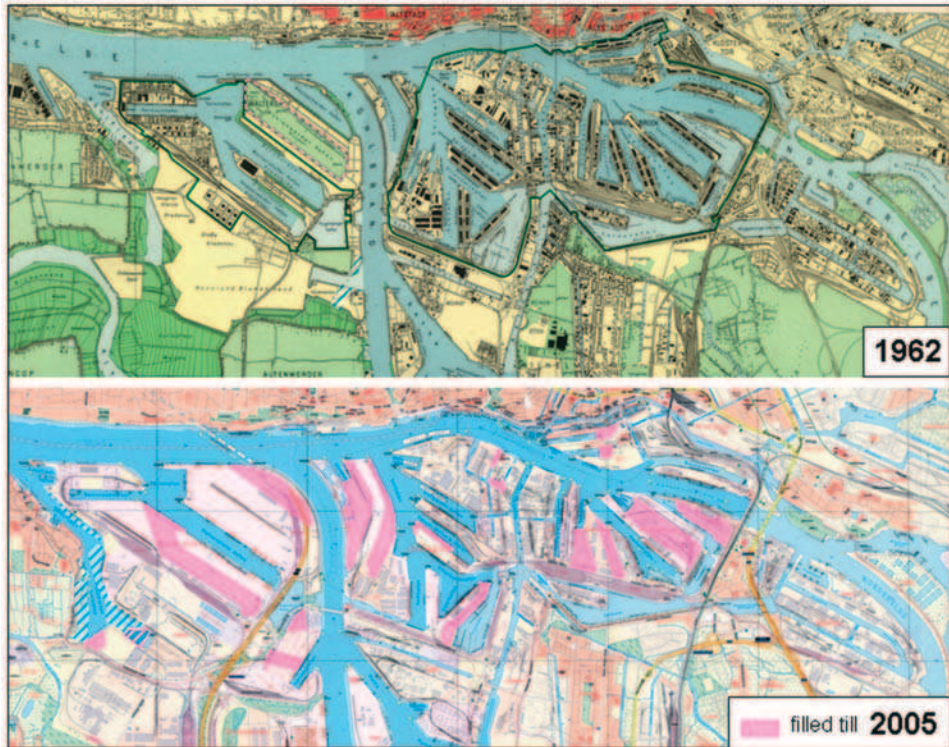


Fig. 3: Restructured areas 1962–2005

sustainable land management. The ongoing project “Restructuring of the central freeport area” is a consequent continuation of Hamburg’s successful strategy of “Inward harbour expansion”.

5. Future Developments

5.1 Forecasts

Container traffic through Germany’s largest seaport more than doubled in the period between 2000 and 2007 to around 10 million TEU. The cargo handling forecast update for the Port of Hamburg by ISL/Global Insight shows that the volume of cargo handled in containers will increase to 18 million TEU by 2015. The total volume of cargo will increase to 221 million tons (2007: 140 million tons), and around 76 % of all cargo will be packed in containers.

In the 2025 forecast for maritime transport as part of the federal transport route planning, Planco Consulting predicts that the total volume of goods handled in Hamburg in 2025 will be 337 million tons. Container traffic will increase to 235 million tons (not including tare weight), which is equivalent to 27.8 million TEU, putting Hamburg ahead of Rotterdam in terms of container volumes handled.

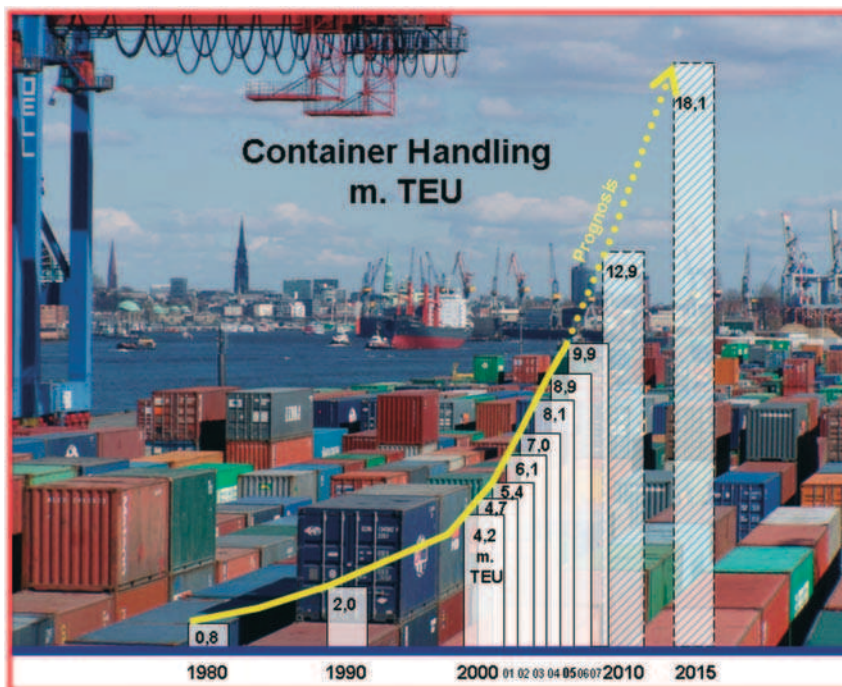


Fig. 4: Container handling prognosis

An investment volume of € 3 billion has been budgeted for the port expansion project, which will run until 2015; this extension and enhancement programme will enable the port to fully exploit all the opportunities presented by the growth in cargo traffic. A central sub-project in the programme is the adaptation of the fairway of the Lower and Outer Elbe.

5.2 Increasing Infrastructure and Superstructure Capacity

The predicted growth in the volume of cargo handled in the Port of Hamburg presents a major challenge for the port's development. The objective of all plans is to provide the necessary handling and transport capacities in a timely, synchronised manner. The strategy which is being used to achieve this goal comprises three coordinated components: increasing efficiency – upgrading existing sites – expansion. The Port of Hamburg's strategy has received international acclaim for its resource-saving redensification approach.

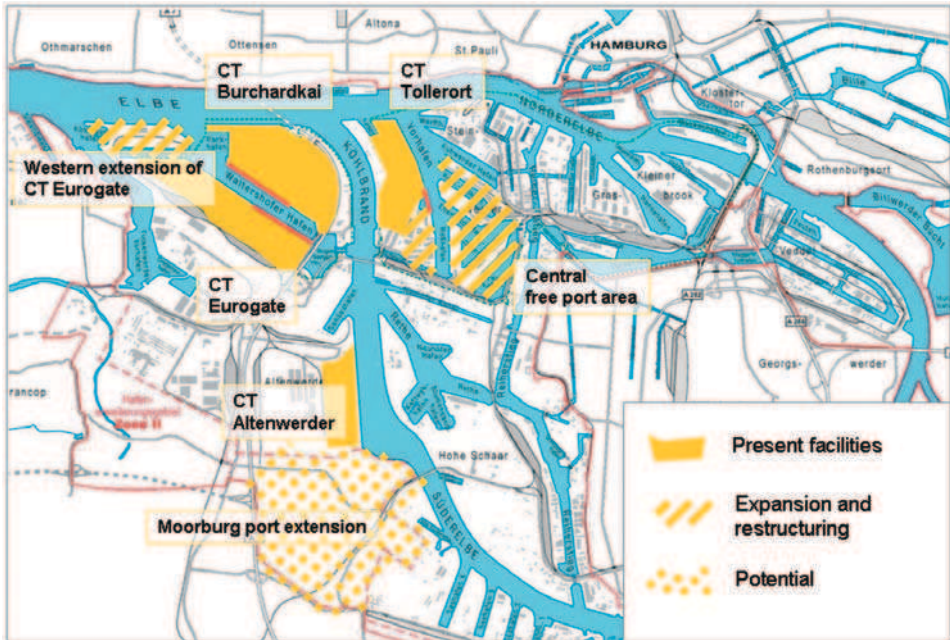


Fig: 5: Overview of the expansion projects

5.2.1 Container terminals

The expansion of the existing terminals will include the following measures:

- the capacity of Container Terminal Altenwerder (CTA) will be gradually increased to 3.0 million TEU by 2008 with the final extension target of 4.1 Mio. TEU,
- the handling capacity at Container Terminal Burchardkai (CTB) is to be doubled to 5.2 million TEU by 2012,
- in a two-phase project, the capacity of the EUROGATE Container Terminal Hamburg (CTH) will initially be raised to 4.0 million TEU by 2009,
- the western extension of CTH will increase the capacity by a further 2.0 million TEU to a total of 6.0 million TEU by 2014 and
- a variety of measures at the Container Terminal Tollerort (CTT) will increase the terminal's handling capacity to 2.1 million TEU by 2010. Further options for the extension of CTT will allow to create additional capacity.

HHLA CTA

At Container Terminal Altenwerder (CTA) a variety of additional internal improvement measures, site expansions and the optimisation of internal landside processes will increase the capacity from the current level of 3.0 million TEU to 4.0 million TEU. In order to achieve the necessary productivity targets for vessel handling, an optimised horizontal transport (AGV) system must be used to operate all gantry cranes. To optimise the AGV rail system, the Bullerrinne tidal gate at the northern perimeter will be overbuilt in order to create an extension site of approx. 1 ha in the northern section of the quayline. The terminal's expanded

container capacity will also lead to an increase in the volumes of project and mixed cargo consignments handled here. Additional sites totalling 2.3 ha will be created to handle these types of consignments in the area directly adjacent to the North of Korbmakersand.

HHLA CTB

In the first extension project, a new berth for large container vessels will be built directly to the West of the present Berth 1. The new berth will also integrate a berth for feeder ships. The total length of the new extension will be 435 metres plus a 60 metre wing wall. In a subsequent extension project, the wing wall can be upgraded to form a complete quay wall. In the next phase, another new berth for large container vessels will be built to the West of the present Berth 2. A new yard design, based on the system in use at CTA but with an optimised stacking block system, has been gradually phased in at CTB since 2007. There will be 29 blocks, each with three automatic stacking cranes on separate tracks, capable of passing over each other.

EUROGATE CTH and the western extension

After the new Berth 2 at the Predöhlkai has been completed and starts operating, a further berth for large container vessels will be built in the third project phase. The total length of this new extension will be 330 metres. The extension of the Predöhlkai and the Bubendeyufer will create around 1,000 metres of new and highly efficient quay line for handling large container vessels. The new stretch of quay line created by the western extension joins the existing berths at the Predöhlkai and extends north for approx. 600 metres down to the Elbe. There it turns to the West and extends for approx. 400 metres parallel to Bubendeyufer. The seaward access to the new berths is to be deepened, and the turning circle in the Elbe in front of the new quay line will also be enlarged to a diameter of 600 metres. By filling in the old Petroleumhafen and including the sites located to the North of the harbour basin, 40 ha of additional terminal sites and storage area will be created.

HHLA CTT and restructuring the central freeport

The gap between the Europakai and the Hachmannkai is to be bridged by building a new stretch of quay line with the same draught conditions for the new generation of very large container vessels. Similar to that at Waltersshof; the new quay line is designed to be optionally extendible to the South to keep pace with future growth. Demolition of the old structures and filling in the old basins will be carefully planned to ensure that the work takes place in as short a time as possible and that all mass balances are maintained. Operations will gradually extend towards the filled-in basins of the old Vulkanhafen and Kohlenschiffhafen. The access to the central freeport will be enlarged to accommodate vessels up to 400 metres in length. This will be achieved by demolishing sections of the Toller Ort headland. The measure will also serve to create an access channel to the future Container Terminal Steinwerder. Work on this new terminal, which will be created by completely restructuring the eastern part of the central freeport, is to start in 2011. By 2016, the cargo handling capacity of the central freeport will increase to between 7 and 8 million TEU.

As of 2016, all Hamburg's container terminals will have a combined cargo handling capacity of around 23 million TEU. This target will be achieved by upgrading existing facilities, boosting efficiency and implementing expansion measures within the present port area.

Development of the Altenwerder West logistics site

After the last remaining empty sites in the Dradenau industrial area and the Altenwerder industry and logistics centre have been developed there will be no further sites available for major development projects. At some point in the future, the port could potentially be unable to meet the demand for new sites. To avoid this happening and to ensure that the port remains in a position to offer companies suitable sites, approx. 40 ha in the Zone II port expansion area to the South of the present Altenwerder West logistics centre will be developed and will become part of the utilised port area.

5.2.2 Traffic Infrastructure

Rail

Rail transport is set to play an even more important role in transport services to the hinterland in the future. With trains accounting for 25 % of seaborne traffic and with moderate growth in bulk commodity traffic, the volume of goods transported by rail will double by 2015. The number of trains will increase from the present 200 to 400 trains a day via Hamburg. The Hamburg Port Authority (HPA) responded to this anticipated growth by preparing a “Port Railway Hamburg 2015” master plan in close cooperation with the German national railway company, Deutsche Bahn (DB) Netz AG, and all other parties involved. The master plan was passed by the senate and local government of Hamburg. The development concept includes the following objectives:

- priority is to be given to upgrading rail infrastructure in the Port Railway facilities, the terminals and cargo handling companies,
- efficiency is to be increased by optimising and enhancing the coordination of processes and interfaces between all parties involved, including all IT systems and
- the infrastructure of DB Netz AG is to be upgraded.

Based on the results of the maritime traffic forecasts of the Federal Ministry of Transport, Building and Urban Affairs’ (BMVBS) and the Port of Hamburg’s updated cargo handling predictions, a new master plan will be prepared for the period up to 2025.

Inland waterways

Inland shipping is the most eco-friendly method of shipping cargo from the seaport to the hinterland. The Mid and Upper Elbe represents an environmentally compatible and cost-effective transport route for cargo going to and from the growth regions of south east Europe. The target is to provide a minimum depth of 1.60 metres on 345 days a year as soon as possible and well in advance of the 2010 deadline being discussed by the federal government. These conditions are required to maintain regular transport services between Hamburg and river ports on the Mid and Upper Elbe, right down to the Czech Republic. Improving the navigability of the network of canals in northern Germany, including the Kiel Canal, also plays an important role in ensuring that the transportation of cargo from Hamburg to the hinterland is as clean and environmentally friendly as possible.

Road network

As part of the “Port Road Network 2015” master plan, a traffic concept is presently being prepared to identify all construction measures that will be required. Additionally, the traffic concept examines the impact of operational and organisational measures.

Key construction projects include the following:

- The A 252 cross-port motorway link, which will serve the purpose of keeping the main route through the port clear of non-port traffic and which gives the container terminals in the central freeport a direct link to the motorway.
- Improving traffic flow in the Süderelbe area by building a new bridge to reduce traffic on the old Kattwyk bridge, which is too narrow to cope with present traffic volumes.
- Better road links to the existing terminals and the construction of landside access to the new terminals.

Freeport boundaries will be shifted back from the main roads, which will help to ensure that traffic flows smoothly through the port area. The urgently required extension work on the A 1 and A 7 motorways and the completion of the A 26 and link to the A7 motorway must be expedited to ensure that hinterland traffic from the port can run smoothly.

The “Port Road Network 2015” master plan will also include an in-depth analysis of the potential for an effective traffic management system for the port’s road network, an integrated traffic control scheme for the trucks entering the port and an action plan to implement these recommendations.

5.3 Deepening the Fairway in the Lower and Outer Elbe

The Lower Elbe, a federal waterway, is the seaward access to the Port of Hamburg. It is one of the most important and busiest waterways in Europe and is also the lifeline of the entire region. Under the plans for the fairway adaptation, the Lower and Outer Elbe would be made navigable for large vessels with draughts of up to 14.50 m. Recent years have seen a steep increase in the number of very large container vessels with draughts of 14.50 m. These vessels are expected to become the typical workhorses in the booming international cargo transport industry.

Presently, the Lower Elbe can only be navigated by departing vessels with a maximum draught of 12.50 metres independent of the tide and 13.50 metres at high tide. This means that restrictions will apply if the new super vessels wish to dock in Hamburg, which they can presently only do when not fully laden. Adapting access conditions is urgently required if the Port of Hamburg intends to continue playing a leading role in global container traffic. Container handling will continue to be increasingly important for the city and the port.

The section of the fairway which must be adapted is around 130 km long and stretches from the Port of Hamburg to the Großer Vogelsand in the Outer Elbe. The implementation of this project will require that around 38.5 million m³ of sediment – mainly sand, but also till deposited in the ice ages – be dredged in the fairway. The major portion of the dredged material will be used for an integrated river construction project at the mouth of the Elbe. As part of this project, submerged banks will be built to minimise the hydrological impact of the fairway deepening. The river construction plan also helps to ensure that the fairway adaptation project is environmentally compatible and has no impact on high tide levels. The impact of the fairway project on the environment will be minimal.

The fairway adaptation will commence as soon as the planning approval procedure has been completed. The approval is expected in mid-2009. The realization of this important project will make a substantial contribution to the port’s economic viability and ability to compete globally, and will help to boost economic growth in the whole of northern Germany.

For further port development information concerning e. g. 'City and Port' or 'Environmental protection' see the port development plan "Focus of dynamic growth markets – Prospects and development potential for the Port of Hamburg". It is available at Hamburg Port Authority, telephone: 040/42847-2311 & 040/42847-2301. Internet: www.hamburg-port-authority.de.