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## Hamburg — An Up-to-Date Port

by Dr Karl-Ludwig Mönkemeier, Hamburg \*

In order to evaluate transport developments and their impact upon ocean ports, the observer must not forget that ports are only one link in the chain of ocean freight transport. This means that their own development is not only dependent on their handling and berthing facilities and those of their operators, which serve the industries that use the ports, but also on the changes which take place in transport industry generally, especially in ocean shipping, or in foreign trade, but also including shifts of industrial locations when, for example, production plants move from the hinterland to the coasts because they want to take advantage of deepwater harbours.

### **Mechanisation of Freight Handling**

This imposes on all large sea ports the duty to reform both their technology and their organisation of work and goods flow, so as to adapt them to novel needs. Such changes become necessary because handling of general freight has until recently used largely the highly traditional methods of shifting the individual items—boxes, crates, cartons, barrels, bales, etc.—singly, or in larger bundles, but never joined up in standardised units. This method of handling, keeping tallies, and stowing goods in ships' holds is highly wasteful of time. The new method is to join up the multitudes of small and even minute individual parcels in larger loads, which can be moved much more easily. This enables loaders and handlers to push mechanisation forward greatly and to increase enormously handling performances per work shift, which leads to increases of overall productivity. In order to reap the full benefit from these possibilities, it was necessary to re-plan the

available handling facilities on completely new principles.

### **Roomy Quaysides and Jetties Needed**

To enable ports to handle big numbers of containers, new quays with large surfaces must be built. The large area is needed because all the containers, before they are loaded into ships, must be placed on the quayside in the proper order, sorted according to weight and size (twenty and forty-foot units separately), and in the sequence in which they will have to be lifted out of the holds again in discharging ports and other loading points on which the ships may call, in order to avoid loss of time in their handling. For containers which will be both emptied and refilled at the terminal, there must be large sheds accessible to moving and handling equipment employed on the shed floor. It is therefore necessary to make these warehouses and sheds many times larger than the conventional ones of the past. In addition, sufficiently large surfaces must be available for intermediate storage of containers which have been lifted from arriving ships, because direct lifting from ship to rail car would waste too much time through the necessary shunting of goods trucks under the container lifting bridge cranes.

For moving containers on the quayside between landward storage areas of the terminal and the ships' berths, surface transport equipment, e.g. van carriers or straddle carriers with their tractors, will have to be used. Finally, to lift and handle containers, it will be necessary to design special hoists and bridge cranes able to move in a single operation containers holding loads weighing up to thirty tons, and if the so-called twin-twenty method is used, to shift in one operation

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two containers of twenty feet length, even up to forty tons.

### **Reorganisation of Work Procedure**

Container terminals, however, can only operate efficiently when not only their layout and technical equipment is renewed but also their work-flow is redesigned. Handling and shifting containers becomes a highly complex operation divided up into many distinct phases—including container registration, drawing up the preliminary storage programme, organising intake and outflow of containers, etc.—which must be compounded into a single unified and coordinated chain of operations. To supervise and direct all these different operations systematically, computerisation is successfully being employed.

All this requires both highly advanced handling and transport equipment and also a fundamental change in organising work-flow and operational supervision in ports, whose traditionally small operational units have proved too rigid and of insufficient flexibility for modern transport needs.

Little work of human operators is needed for loading containers on to specialised ships by means of specialised handling equipment. The bigger the freight contents of individual containers grow, the lower will be the demand for human operators, which reduces port employment. This demand will fall the more steeply, the higher the share grows of container traffic going directly from the plant of the maker to the premises of the user of goods in total container traffic of a given port, which means the stronger the shift of traditional port handling operations from port to hinterland affects the ports themselves.

### **Container Handling in Hamburg**

The first container ship from the United States which called at a European port in 1966 was the forerunner of an inevitable process of transformation affecting, in time, all the other large continental general freight ports by opening them up to container transport. It was therefore necessary to take early measures for making the ports fit to discharge container ships.

When the decision was made to use the Burchard Quay for discharging and reloading container ships, one of the decisive factors was the availability of additional free land ideally suited for creating a big container terminal. An additional advantage was that it could be envisaged, in later building stages, to create new ships' berths in Park Harbour, along the Northern Elbe river branch, and in the Maakenwerder port, which all

have sufficient land reserves for placing there the required large handling and storage surfaces. The overall design, moreover, has the benefit of direct access to the future berths from the wide Lower Elbe River, which protects loading and discharging operations against the wakes of passing ships.

The final decision to place Hamburg's container terminal in the area of the Waltershof Port was made for the planners by the prospect that, from 1973 onwards, a new federal Autobahn would pass this area, making for easy access to and from the existing motorways leading southward from Hamburg to Southern and Western Germany and northward to Kiel and Flensburg. Such excellent traffic connections enable inland transport to reach directly, without detours, the container terminal.

### **The New Berths**

When it was learnt that also traditional North Atlantic shipping lines, European shipowners included, intend to make use of fully containerised ships, so as to enjoy the full economic benefits of container transport, it was decided to build the first berth for fully containerised ships at the Burchard Quay, and one year later, the second one.

A third construction stage for making a third berth for fully containerised ships available was entered upon after British and continental shipowners had announced their plans to run a fully containerised service between the continent of Europe and Australia from 1970 onwards.

When building operations will be completed in the summer of 1970, there will be five ships' berths available at Burchard Quay, 1,170 metres (3,831 feet) of quayside length, 340,000 square metres (3,663,160 square feet) of storage surfaces in the open and in sheds, and four container bridge cranes. It has since been decided to run fully containerised services also between Europe and the Far East, probably from the autumn of 1971, and it has become necessary to build a sixth berth at Burchard Quay, which will be the fourth one for fully containerised ships.

As the number of container line shipping services grows, so does the number of containers handled. In the port of Hamburg, the rise in their numbers from 1968 to 1969 was 65 p.c. to a total of 64,000 containers (calculated in twenty-foot units). That is why it is not sufficient to provide only handling gear and storage surfaces but to organise a fast and continuous intake and outflow of containers is imperative, so as to prevent hitches and stoppages. That is why sidings and loading equipment for railway transport are being enlarged rapidly.

When this work will be completed, virtually only half of all the building sites lying between the Waltershof Port and the Northern Elbe will have been used up. Depending on the growth rate of demand for further handling capacity, the container terminal could be enlarged by creating six more ships' berths and another 500,000 square metres (about 5,380,000 square feet) of storage and other spaces.

### **Rapid Turnround**

Among all the European ocean ports, only Hamburg has the advantage to be able to use three bridge cranes for unloading and loading container ships, and within a few months, their number will have risen to four. Only the Port Elizabeth terminal of New York has facilities of a similar capacity. The factor of mechanical and economic efficiency will play at least as important a part in the decisions of shipowners about which ports should be used for the call of fully containerised ships there, as does the size of a given port's turnover of goods, especially because big ships, which cost much in capital and operational terms, require rising efficiency of handling precision and handling speeds.

In the Waltershof Port, there is not only the Burchard Quay available for handling container ships with specialised gear, on the opposite side of the water, there is also the Predöhl Quay where facilities exist for meeting all the requirements of the liner services which call there. This is a second container terminal, which is still building. It is operated by Euro-Kai AG. Its design is different from that of Burchard Quay, in so far as it will become a venue of "mixed operations", handling not only containers but also all other types of unitised loads and conventional general freight.

### **Towards Large Concerns**

Additional handling gear, in part of a highly advanced type, is available in the eastern section of the port, for moving both unitised loads and individual pieces of general freight, e.g. the Europa Quay with the multi-purpose lifting gear of the company "Lager- und Speditionsgesellschaft", the Afrika Terminal on Kirchenpauer Quay, the Hapag Terminal in Kaiser Wilhelm Port, and the completely rebuilt quay facilities at Shed No. 55/56, which mainly transfer loads truck-to-truck, involving the use of forklifts stationed on board ship and/or on the quayside for transferring "paletted" bulk loads through side openings in the ships' hulls.

Hamburg's port organisation has also developed new initiatives in the field of company structure and company operations. Thus, much progress has been made in "integrated ships' handling", especially in moving containers, implying that several port service companies combine to quote comprehensive prices for all their operations. There have also been numerous vertical mergers between shipowners, freight handling firms, stevedoring companies, warehousing, port lighterage and tugging enterprises, ships' brokers and forwarding companies, and even finance houses and insurance companies have joined on occasion. There is a distinct trend towards building big companies. It can be foreseen that, in Hamburg as in other large North European ports, the next few years will see a much diminished number of individual port service firms but those that survive will be much bigger and run a large selection of diversified service departments, becoming "all-round" companies.

### **Prospects for the Future**

Evolution never ceases, so that only those ports will hold their own in a highly competitive world which are flexible enough to respond swiftly and in good time to newly developing demand. For this trend, there may be given a few examples here:

It can be foretold already now that, from 1971 onwards, there will be many combined ships calling at Hamburg, which provide both for container transport and for roll-on-roll-off transport. This means that container terminals must also be equipped with ramps for this kind of "rolling-stock". New quaysides must be built even though existing berths may not be fully utilised to capacity. If Hamburg's city council agrees, this will mean construction of both a sixth and seventh berth at the same time, the seventh one to be equipped with a roll-on-roll-off ramp, in addition to container handling gear. Ports must also adapt themselves to the fact that one subsequent generation of new container ships after the other will be longer and have deeper draught than the preceding ones, which makes dredging of harbour channels and berths inevitable.

From its very beginnings, the port of Hamburg has always met innovations in the shipping trade and in port handling techniques with an open and receptive mind, striving to offer both shipowners and loaders the best of all available handling and loading facilities. This is to remain so in the future because it is to the benefit not only of the port itself but also of Hamburg as an integrated economic unit and the entire province situated between the North Sea and the Baltic.