

# Coming into port

While cement represents only a small part of the dry bulk shipping market, it has its own requirements in terms of port facilities and market dynamics. With seaborne trade continuing to grow, it is vital that ports understand each market and install facilities that best serve them.

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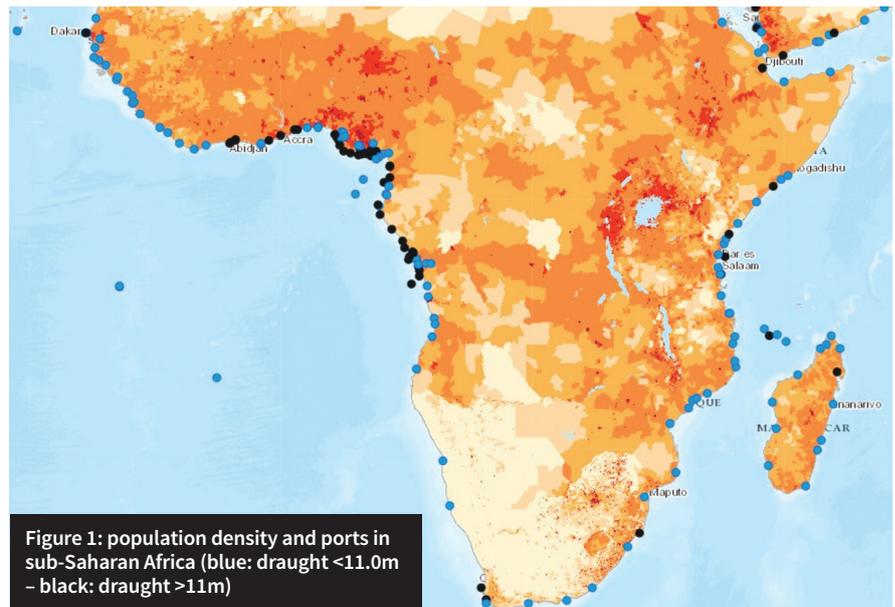
Some 90 per cent of world trade volumes are carried by vessels. The seaborne trade of dry cargoes currently exceeds 7bnta. Out of total global cement production of 4.1bnt, some 188Mt, or less than five per cent, is internationally traded, according to *The Global Cement Report™*, 12th Edition. A similar volume applies to transport via domestic waterways.

While the cement industry's prime sales commodities are cement and clinker, its waterway flows also include solid fuels, gypsum, slags and other materials. The combined trading volumes of these secondary products are around 25 per cent of the cement and clinker volumes – small when compared to overall global trade.

Despite this seemingly marginal role, international cement trade has a relevant function in price alignment, with the concept of 'import parity price' well established.

## Ports

Ports through which this seaborne trade is conducted are strategic infrastructure assets for any country. However, the number of commercial ports around the world is not very large – around 3600 – and



less than 800 have water depths exceeding 11m at anchorage and berth, which allows the entrance of medium-sized bulk carriers.

Furthermore, there are more than 50 countries with a combined population of 1.2bn that have fewer than three of such ports. To accommodate rising traffic, these ports, as well as many others, will have to

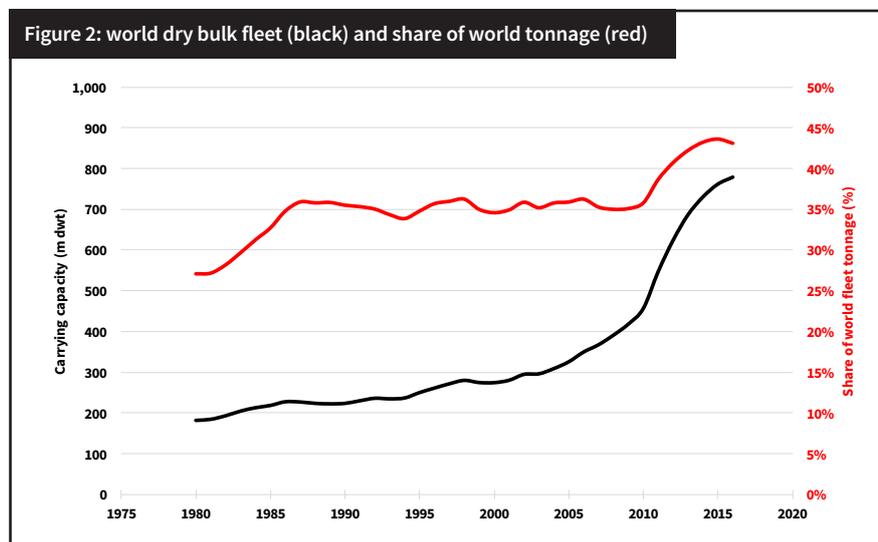
expand (see Figure 1).

However, due to their nature and nodal character, ports are often subject to strong constraints on their development.

## The cement fleet

Some 800mdwt, or around 40 per cent of the world shipping fleet by tonnage, is represented by modern bulk carriers (see Figure 2). In recent decades the top of the class has grown considerably. In 1980 there were just two bulk carriers above 200,000dwt – today this figure has risen to 90 with the largest bulk carrier now at 400,000dwt.

The dry-bulk market has no single 'workhorse'. Panamax vessels (60,000-80,000dwt) are squeezed between the larger Capesize (>120,000dwt) and the Handy/Supramax (40,000-60,000dwt). Larger economies of scale apply at the top, but more flexibility is present at the bottom. However, there is a steady movement towards using larger vessels. The average bulk carrier in 1985 was 35,000dwt while today the average is 70,000dwt (see Figure 3).



But cement is just a 'minor bulk', with specific constraints. The average operation now involves ~40,000t, compared with 20-25,000t in the 1980s, but ships exceeding 70,000dwt are infrequent. Globally, domestic distribution seldom uses ships above 10,000dwt and seagoing barges with more than 10,000dwt are rare.

Finally, pneumatic cement carriers are an important part of the fleet used by the cement industry: they sail on local and regional routes, and their average size is just below 7000dwt.

### Bulk storage and throughput

Is the cement industry free of the economies of scale in shipping? No, but

the powerful forces that act on coals, ores and grains have specific constraints in this market.

One of these constraints is that bulk cement and clinker require careful cleaning of the ship's holds prior to transporting other products (where possible, ship owners would prefer to transport other cargoes).

Moreover, cement and clinker require specific storage near the port. Minerals and solid fuels can be easily stocked in large, multi-user yards and handled by very efficient systems. This is not the case in the cement industry, where each operator has its own storage installation, equipped with transport systems of which

capacities are often a fraction of those used with the minerals. Throughput of cement is relatively small when compared with the minerals sector as cement trading operations are often a counter-balance to swings in the domestic markets.

Silos matching the capacities of larger ships and high-capacity facilities would have to be built close to the berths. However, the financial muscle supporting such ventures cannot achieve the larger economies of scale present in the minerals sector due to the swing function of the cement export facilities.

### Freight and handling rates

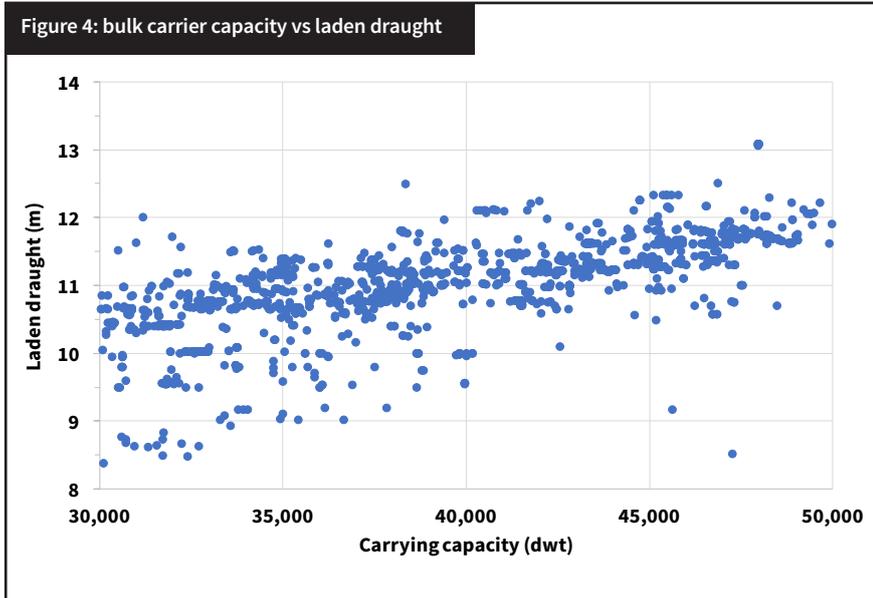
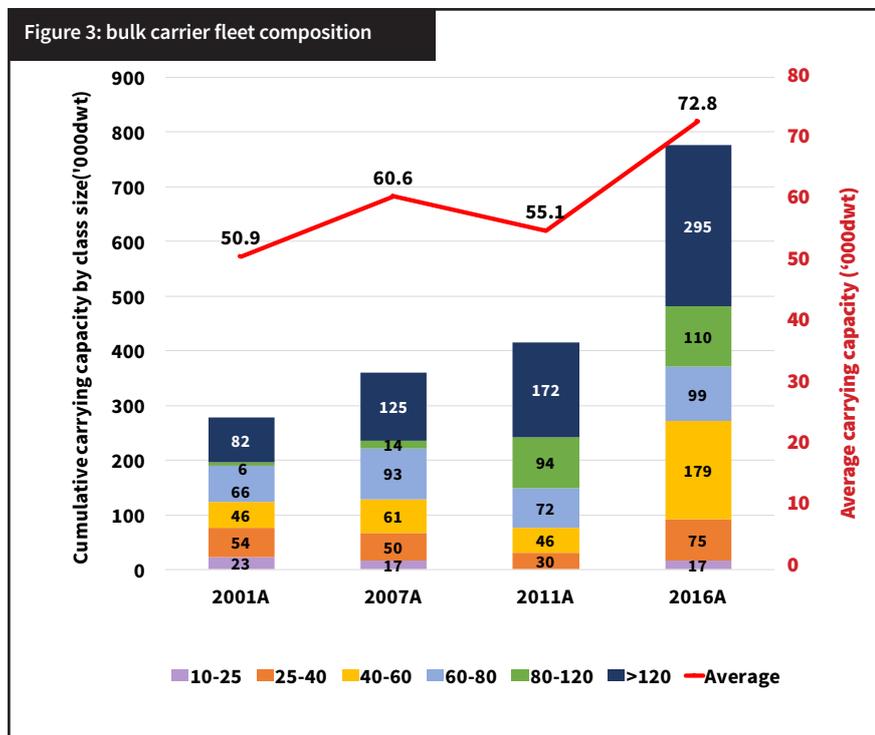
Freight rates are volatile, but if all other things are similar, the ship loading and unloading rate often makes the difference, particularly if storage and throughput are fixed.

There is a direct link between market location, ship size and handling rates. If an operator's best performance is to load a Supramax (~50,000dwt) at 5000tpd, then he is simply out of the market. But if he can load a small Handysize (~20,000dwt) at 12,000tpd, he will only obtain a small advantage compared to a competitor working at 8000tpd.

On the other hand, a Handysize will only be competitive in local markets and Handymax ships, which tend to operate regionally, will find it challenging to compete on some transcontinental routes where larger ships such as Supramax and Panamax benefit of economies of scale. Therefore, in the highly-competitive freight market it is a matter of survival to know the target market and to have a facility installed that best serves that market.

### Bringing the vessel to port

Expanding a port's capacity for larger vessels often, but not always, involves



**Figure 5: corrosion damages in the jetty of an export facility**



Figure 6: extension of cement export jetty (white: existing infrastructure – red, green and blue: extension and reinforcement)

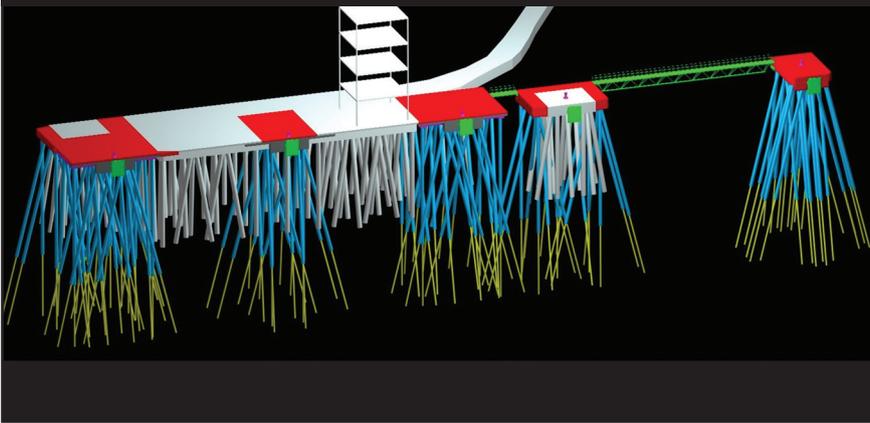
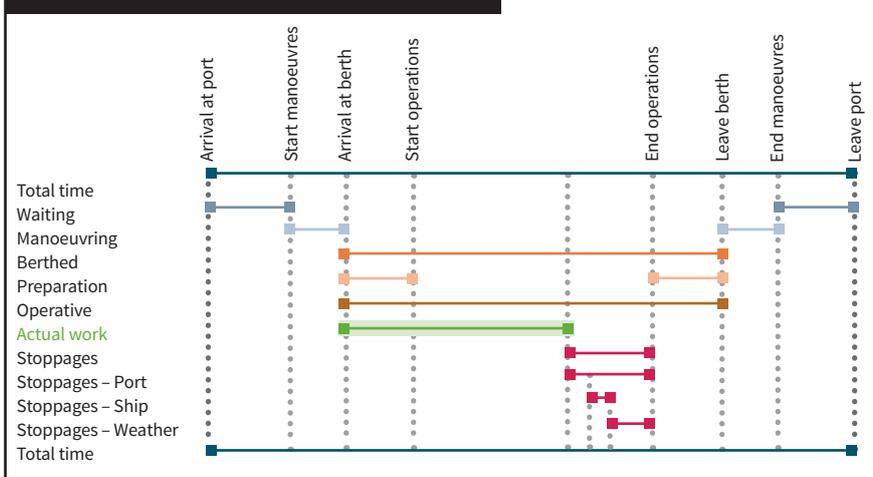


Figure 7: breakdown of time vessel spends at port



dredging. However, solutions other than dredging exist, including:

- Vessels come in a variety of dimensions and it may be possible to find vessels of a given capacity with a loaded draught range difference of 2m. There is an interesting niche for shallow vessels (see Figure 4).
- The under-keel clearance (distance between the ship's bottom and the sea bed) can be dynamically managed rather than statically fixed, without affecting safety.
- Tide riding (sailing with the high tide) is often possible, as a compromise between the expenses of dredging the channel and the ship's waiting time for the appropriate tide level.
- The use of false freight (not fully loading the ship because of draught restrictions) can sometimes be combined with a second port calling.

Many ports in the world face dredging problems, such as siltation issues, which reduce their income and so their ability to engage in maintenance dredging. Industrial ports may have contaminated

sediments, the handling of which can be a nightmare. In almost all of these cases, financing, the availability of suitable dredges and environmental studies are also important aspects to be considered.

### Berthing the vessel

Receiving a larger vessel has three main effects on the berthing infrastructure:

- Deeper waters may be required and therefore, an excavation of the foundations may be needed.
- The vessel gives rise to larger forces, mainly at berthing, but also while moored.
- The material handling equipment installed onshore may introduce heavier loads.

It is critical that in the expansion of an existing marine facility the condition of the structures is taken into account. Industrial ports are aggressive environments and many cement operators lack the required maintenance culture. It is all too common that marine facilities are not well maintained and that only emergency actions are taken (see Figure 5).

*“While there is a natural tendency in expansion for ‘newer and bigger’, there is often room for down-to-earth equipment and operational improvements.”*

Furthermore, fenders are crucial for a berth facility and they can make the difference between being able to receive a given vessel or not.

There are also vessel monitoring systems that assist the mooring operation and can help to reduce the berth loads. But if they are not properly used, they can provide a false measure of safety.

Excessive ship movements can also impact the unloading and sometimes also the loading. A well-designed mooring system can reduce the forces and the extent of these motions.

It may be necessary to modify the berthing structure, be it a quay wall, a jetty or dolphins. Piled structures are typically easier to reinforce or extend, but in all cases it is a delicate task that requires qualified design and execution (see Figure 6).

### Serving the vessel

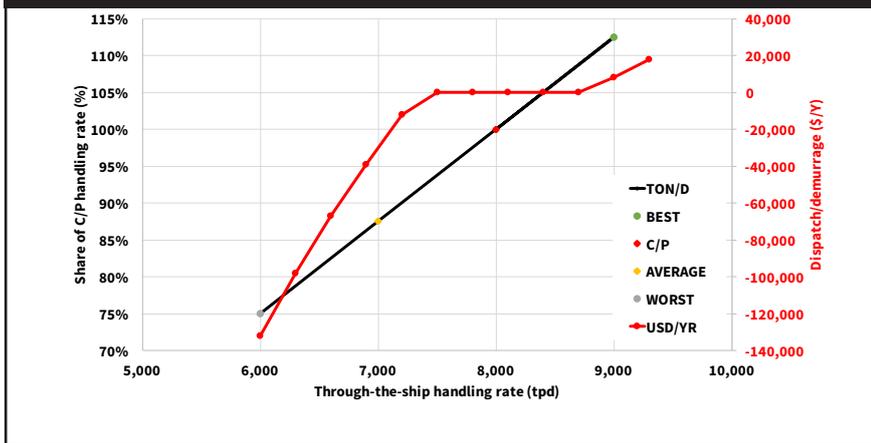
Seaborne trade has grown very quickly and has left many ports with insufficient capacity. This often translates into an increase in ship waiting times, which will have to be paid.

The vessel starts counting time when it delivers the Notice of Readiness, usually upon arrival at the anchorage area or the access channel, not when it berths or when loading/unloading operation starts. The range of such times is large and the specific conditions are important, but the worldwide average for bulk carriers is close to four days of waiting time per ship call.

In addition, much depends on the capacity of the material handling equipment, which must be sufficiently large. However, there are several ways of defining capacity. Equipment manufacturers focus on the peak capacity, plant engineers tend to talk about design capacity, and port managers also deal with through-the-ship figures.

Once in port, the time a vessel spends includes waiting for berthing, manoeuvring, inspections, surveys, breakdowns and

Figure 8: effect of the through-the-ship handling rates on demurrage and dispatch (specific case)



weather stoppages – only a fraction is used for the service of the ship (see Figure 7). The range of this fraction utilisation and the internal breakdown vary for each operation, but it is a general trend that inadequate investment in maintenance is taking its toll and that active benchmarking is not always used as it should be.

In many discharging operations, the ratio between the peak capacity and the actual through-the-ship value exceeds four, which

is excessively high. It is also common to see a wide range of effective handling rates in the same terminal, with similar ships. These variations may have economic implications related to the charter party demurrage/dispatch conditions (see Figure 8).

To increase material handling rates, companies tend to look for newer, larger and more powerful equipment. While equipment is important, a detailed evaluation of the overall utilisation factor

is recommended, as there are often many operational improvements that can be made, including:

- Raise the maintenance levels to standard practice, if they have fallen too low.
- Revamp the machines: main equipment manufacturers are now opening shop in this field, even for machines not initially manufactured by them.

### Summary

Cement trading is dynamic. The economies of scale in shipping and efficient performance in terminals will continue to set the way forward in cement port operations. This will require repeated expansion and improvement of port facilities.

While there is a natural tendency in expansion for “newer and bigger”, there is often room for down-to-earth equipment and operational improvements. In any case, expansions and improvements need to be designed with a clear view of the markets to be served and their specific shipping requirements. ■