

From packer to ship

In some countries transporting bagged cement by waterways accounts for as much as 50 per cent of distribution. GlobBULK Consulting looks at the numerous ways in which bagged cement can be loaded onto vessels, including the use of flexible intermediate bulk containers, or FIBCs.

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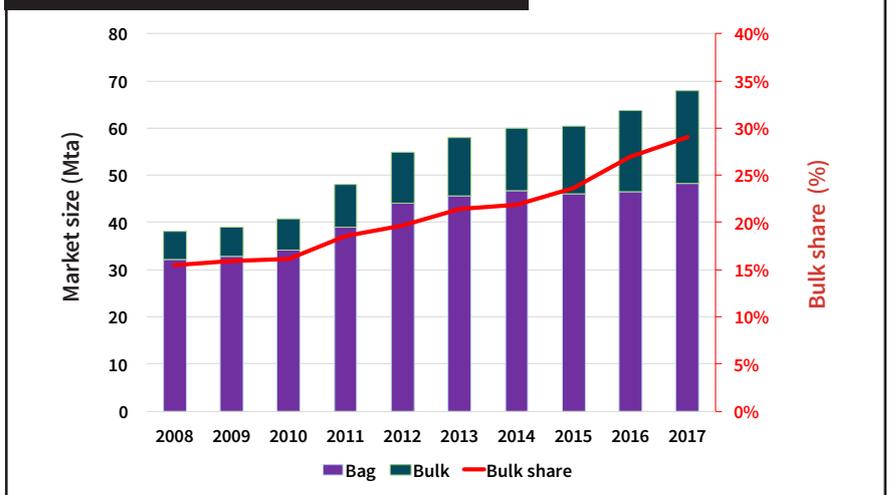
The concept of ‘market maturity’ is often used to classify countries. A developed or mature cement market is one with a strong base of industrial consumers, including ready-mixed concrete plants and numerous large projects. Developed markets are often also characterised by a diversified portfolio of cement types. Many of these are consumed in small quantities, and therefore suited to the bagged market, resulting in large distribution warehouses with a plethora of cement types stored on pallets.

Globally, bulk ratios in these markets can range from more than 95 per cent in mature markets such as Switzerland to less than five per cent as in Bangladesh. In developing countries, such as Indonesia, the situation can be very dynamic (see Figure 1).

Bagged cement on the waterways

The international trade of cement in bags by waterways is relatively small, accounting for around 17 per cent of traded volumes, or less than one per cent of cement production, according to the ICR Global Cement Trade and Distribution Handbook.

Figure 1: bag and bulk evolution in Indonesia, 2008-17



In the US, for example, most of the distribution to the final customer takes place by truck and almost nothing is distributed on the waterways (see Figure 2). However, US cement plants distribute a significant quantity by barge, 35 per cent of which goes to the terminals, although most of this is in bulk shipments. In areas served by the Ohio-Mississippi river system and the Great Lakes, distribution by vessel is far more important.

In contrast, in countries such as Bangladesh, the world’s largest importer of clinker, the inland waterways transport (IWT) system is crucial with around 50 per cent of all cement production moved by boat at some point in the distribution process and nearly entirely in bags. Vietnam, Thailand, the Philippines, Indonesia and China also have an important share of domestic distribution of bagged cement by their waterways, either IWT, coastal shipping or inter-island. In Europe the largest IWT system, the Rhine-Danube, is almost only used for the domestic market and is of little relevance for the cement industry.

The logistics of moving bagged cement by waterways has some specific features, as explained below.

Loose bags

The handling of loose bags is the simplest option for the distribution of cement by waterways but not necessarily the safest or cheapest.

There are three main modes for loading vessels with loose bags:

- fully manual handling (see Figure 3)
- manual slinging (see Figure 4)

Figure 2: distribution modes in US market, 2007-14

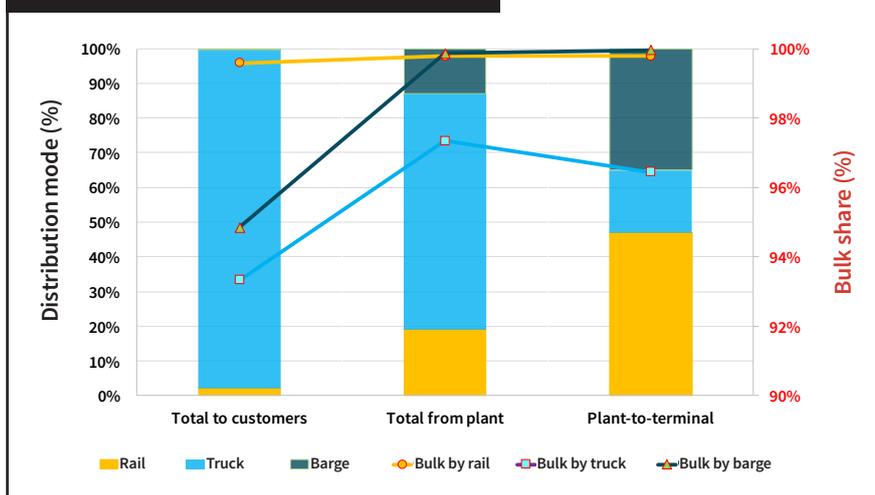




Figure 3: loading vessels with loose bags is often carried out manually



Figure 4: manual slinging provides a loading alternative

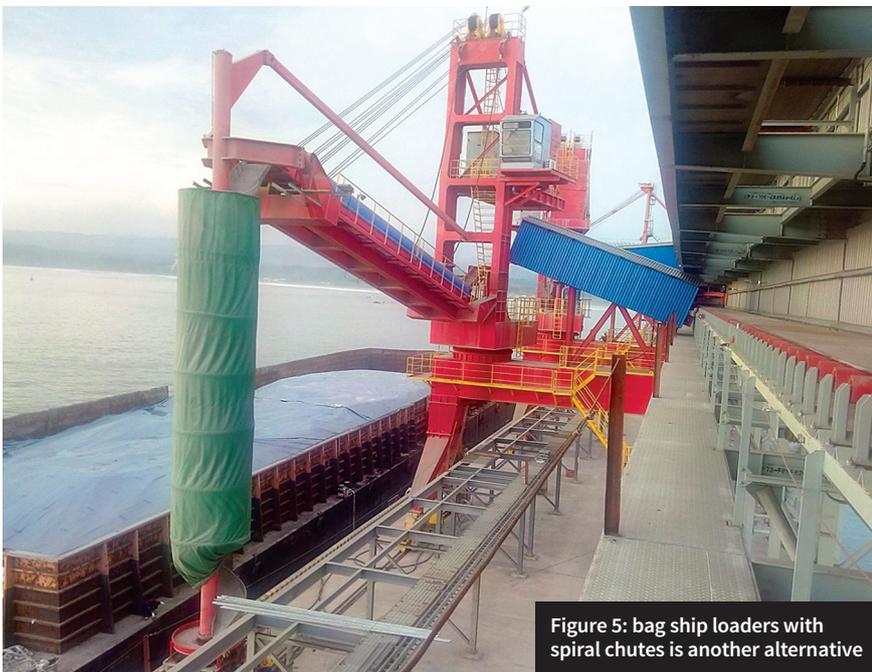


Figure 5: bag ship loaders with spiral chutes is another alternative

- the use of bag shiploaders with spiral chutes (see Figure 5).

While full manual handling is not uncommon in many Asian countries, it raises serious safety concerns and is mostly restricted to small distribution tasks. Far more frequent is the use of trucks parked alongside, and the transfer of bags from the truck to the hold using slings or nets and cranes. This operation is also not without its safety hazards, and the double manipulation on the truck and the vessel can negatively affect both the transfer rate and the cost.

Where the packing machine is close to the loading berth, it is possible to use a bag shiploader. Some equipment manufacturers also supply bag shiploaders on tyres, which can be fed with loose bags from trucks or containers. Large bag shiploaders have been built and are still in

operation, but at present the tendency is to use them with small ships and barges.

At the receiving port, however, loose bags still need to be handled individually as there is no bag shipunloader, as far as

the author is aware, and the performance of manual operations is usually very low. Moreover, they are often disrupted by poor weather, especially in monsoon areas, so performance is further affected.

Furthermore, while bag breakage ratios depend on the handling procedure, care taken and the quality of the bags, figures well above five per cent are not unheard of with manual handling. When breakages do happen, this also affects the external appearance of the remaining bags.

In many countries, finding the manpower to manually handle loose bags is not always easy or cheap, a factor which often makes handling cement in larger packs far more attractive.

Filling FIBCs with bags

One alternative to handling loose bags is the use of containers loaded with bags. Although unit freight costs are often high, this provides a reliable and simple solution for not only loose bags but also pallets and big bags.

Another possibility is the use of flexible intermediate bulk containers, or FIBCs. The

Figure 6: FIBCs can have open (left) or closed (right) sides





Figure 7: FIBCs can be manually loaded



Figure 8: sling bags can also be placed on or around empty pallets ready for loading

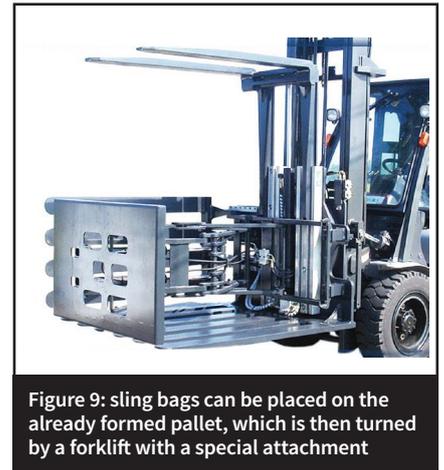


Figure 9: sling bags can be placed on the already formed pallet, which is then turned by a forklift with a special attachment

FIBC is an intermediate distribution option between the conventional bag and bulk, and is often known as a big bag, jumbo bag or supersack.

Pallets are not well suited to the transportation of bags on vessels. Not only are they relatively expensive, they have stock height limitations, require a flat surface, their recovery can be complicated, and, if made of wood, can cause problems with international trade regulations (ISPM15). But they are standard and they offer a straightforward transfer between the truck and the ship's hold.

A common alternative to the pallet is the slinged FIBC, of which there are many types. For the purpose of bag handling, they are usually either open or closed on the sides (see Figure 6). However, the use of FIBCs is relatively recent and there are some associated handling difficulties.

The filling of FIBCs with bags can be carried out manually or automatically. The manual option does not require pallets and can use both open and closed FIBCs (see Figure 7). Some automatic truck loading machines can be used with FIBCs, but another alternative is the palletising

machine. With a palletiser, the sling bag can be placed on and around an empty pallet (see Figure 8). Once the pallet is loaded with bags, the operator raises the sling bag from the bottom and secures it at the top. This procedure is best used with open sling bags and does have its drawbacks as it involves the manual preparation of the sling bag on the pallet, the lifting and tying of the sling bag around the bags on the pallet, and the return of the empty pallet.

Alternatively, sling bags can be placed on the already-formed pallet, which is then turned 180° with a forklift equipped with a special attachment (see Figure 9), but this requires a larger fleet of forklifts fitted with the necessary rotating device.

FIBC handling

If there is a risk of water affecting the cement, the pallets can be wrapped with film, especially if open FIBCs are used. Closed FIBCs provide an additional layer of weather protection, which can be improved with an internal PE film or an upper skirt. While there is a temptation to reuse the FIBCs, the conditions under which they are

utilised once they leave the plant or the terminal are often unknown and a thorough inspection of all sling bags is not feasible on practical grounds. Some plants limit their employment, therefore, to a few controlled uses.

The adequate length, position and shape of the slings is related to the lifting procedure. If the slings are too inclined, their tension due to the weight of the loaded FIBC can break the cement bags in contact with them. The handling of the loaded FIBCs is typically carried out by forklifts at the warehouse and with cranes at the port where spreaders are often used to increase the transfer rate. Some manufacturers produce quick-release spreaders with rotary heads for improved performance (see Figure 10), but the most common choice is the simple spreader.

Storing FIBCs in the hold also requires some attention, otherwise the weight of the pile and the movements onboard can damage or break the bags. The collapse or movement of cargo is not common, as holds tend to be highly packed, but it can occur when spaces are left around or within the cargo. Box-shaped holds, typical of modern carriers, are clearly preferable. Holds with rounded bottoms and protruding reinforcing ribs impair the storage of both bags and FIBCs, while small hatch openings relative to the hold dimensions may require double handling.

Safety

Safety is not only an issue when manually loading individual bags on waterways. The need for lifting equipment, moving vehicles, working at night, repetitive movements, potentially unqualified labour and the presence of water all mean that a detailed assessment is required to make the handling of cement for waterborne distribution efficient and safe. ■



Figure 10: some manufacturers produce quick-release spreaders with rotary heads for improved performance