Build your own import terminal

by Ad Ligthart, Fuller Bulk Handling

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Although the technology of a cement terminal is simple compared to a cement plant, the characteristics of a good cement terminal in most cases are diametrically opposite to the characteristics of a good cement plant. The volatility of import operations and their dependency on the world economic situation are very different to the local circumstances and long term operation of a cement plant.

This article discusses cement import operations and will try to give an insight into the economics that are the basis for import terminal facilities.

Volatility

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Rail mounted unloaders like this one for North Texas Cement in Houston, provide the highest possible shipunloading efficiency

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Distribution Systems

Build your own Cement Terminal

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"Providing Solutions"

FULLER BULK HANDLING

H.W.Carlsen

FULLER KOVAKO

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The present oversupply of cement in Asia and the Middle East will mean a low price for cement in the coming years. This, in combination with strong economics elsewhere, has created an increased interest for cement import terminals. To a large extent, these are existing cement producers that are looking at supplementing their production and protecting, or expanding, their market share. An import operation however, is something entirely different from producing cement, and many companies do not have the required experience.

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The volatility factor

Principles:

a) The growth of cement demand accelerates with an increase in economic growth (C=f * G). (Please note that this applies to both positive and negative economic growth).

b) A growth in cement consumption causes a growth in imported cement which is inversely related to the import market share (CI=C*1/x).

c) Above principles combined give the volatility formula.

CI = f * G* 1/x

CI = Growth in cement import volume

F = Acceleration factor (usually between two and five)

G = Increase in economic growth

x = Market share import volume

Figure 1: The volatility factor

larger decrease in cement consumption.

For a cement import operation the effects are far more drastic due to the principles shown in Fig 1. As an example it can be assumed that a country covers 90 per cent of its cement consumption by domestic production and 10 per cent by imports. If cement consumption grows quickly, the additional consumption will be imported. A five per cent increase in cement consumption will increase imports 50 per cent and a 10 per cent increase in consumption will double the import volume. For this example one per cent additional economical growth causes three per cent additional cement consumption which in turn creates a 30 per cent growth in import volume.

The opposite is also true. A five per cent drop in cement consumption halves the import volume. A 10 per cent drop in principle would stop the imports. This occurs because the cost of running a cement plant below capacity is much larger than the possible financial gains in importing cement. Cement import terminals therefore have a highly fluctuating throughput. Even a small difference in economic growth has a large impact on the economical viability of an import operation.

The situation in California, with an import surge in the late 1970's, no imports in the early 80's, an import surge from 1985-1992, few imports from 1993 to 1997 and substantial imports again this year is an illustrating example of this economic mechanism.

The corresponding requirement is therefore that import operations must be able to have a short payback period and be already economical at low throughputs.

Where is value added?

The cement import terminal itself is an important part of the complete import operation. It should be understood though, that it is only one part and that the economics of an import operation are mostly determined outside of the terminal itself.

Figure 2 gives an example based on a possible import operation on the US West coast bringing in cement from Indonesia. The example shows that 75 per cent of the costs involving the delivery of cement to a local customer is incurred in sourcing and shipping of the cement. Only 15 per cent of the cost is actually incurred in the shipunloading and terminal operation.

It must be appreciated that the present low cement price in Asia will not last forever. Less than 12 months ago the price level was in the US$30, or less level. When the Asian economy recovers the surplus situation will become less dramatic, so prices will increase again. Shipping prices over the years have also fluctuated within several dollars per ton. The economic viability of an import operation is completely determined by these factors and not so much by the combination of capital and operational costs of the cement terminal.

The difference in operational costs between a US$9 million flat storage terminal and a US$25 million silo terminal is at best US$2 per ton. Given the volatility factor and the large possible fluctuations in cement price and shipping, it is questionable whether a large investment for a silo terminal will actually give a reasonable return on investment. Import terminals with a low capital cost have proven to be much more financially successful, irrespective of their higher operational cost.

Possible restrictions on the project?

The technical aspects of a cement terminal are only a minor part of the whole cement import operation. The most difficult part in establishing a cement import operation is to find a solution for the many restrictions that face such a project. Such restrictions can be finding a proper cement source, arranging suitable shipping and finding a good site to establish a terminal facility.

In respect to the cement source, a stable cement supplier with a financially sound background is needed. This company should be able to supply cement of a continuous quality and should be able to provide a long term supply. On top of that, a company needs to have good loading facilities on a deep waterberth. Last, but definitely not least, the cement supplier should have no ties to possible competition. Although at this moment there is an enormous over supply in Asia, there are not many cement suppliers that comply with the above conditions. The number of cement plants with deep water loading facilities is limited. The economic crisis in Asia has severely weakened the financial position of many cement companies. Substantial changes in ownership can be expected in the coming years. To find a suitable long term cement supplier is therefore not that easy.

In respect to shipping there are also a

Where is value actually added?

Example: Cement import operation with Indonesian cement imported in the US West Coast

Cement cost ex-works	US$19.5/ton
Transport to waterside	
Loading into bulk carrier	
Cement cost F.O.B Indonesia	US$21.5/ton
Ship to loading port	
Loading days	
Trip Indonesia to US West Coast	
Unloading days	
Port costs	
Cement cost C.I.F US West Coast	US$40/ton
Unloading and conveying to storage	
Reclaim and truck loading	
Cement cost delivered ex-terminal	US$48/ton
Delivery to customer	
Cement cost delivered to customer	US$53/ton
Sale price	US$70/ton
Gross margin	US$17/ton

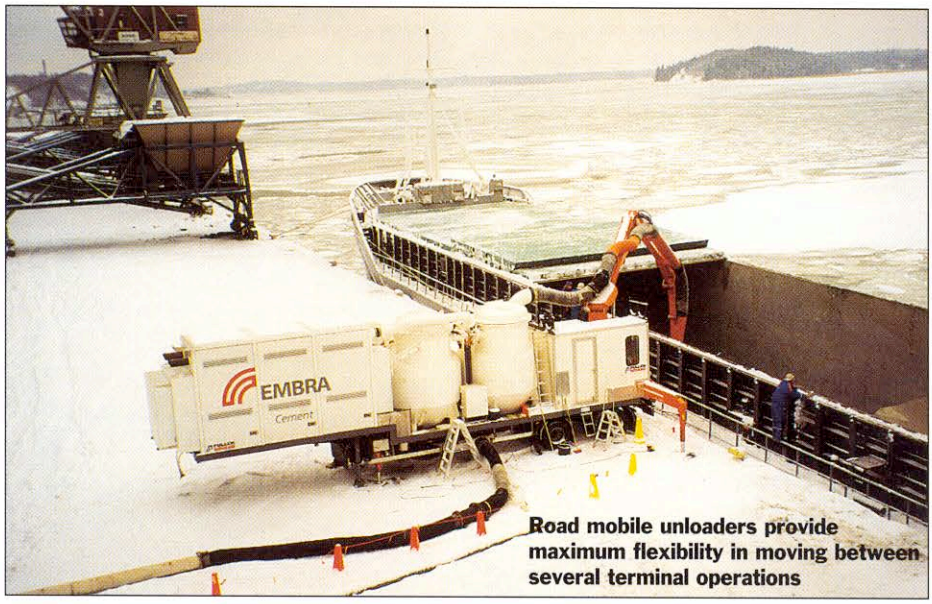
Notes:

1) The cost of the cement plus shipping (total US$40) is more than 75 per cent of the total cost to deliver the cement to the customer. These costs are strongly dependent on the world economy and not on the local market situation. They can fluctuate greatly over the years.

2) The cost of the ship unloading and terminal operations (total US$8, investment + operations costs) is only 15 per cent of the total cost to deliver the cement to the customer. However, this is the part of the cement import operation that requires the major investment.

Please note, that this is an example only.

Figure 2: An example of a possible import operation on the West Coast of the US.



Road mobile unloaders provide maximum flexibility in moving between several terminal operations

number of restrictions. The most important one is the availability of ships on the required trading route. A prime example of this is the situation in the Pacific ocean.

Over a year ago the majority of bulk trade was directed from the American Continent towards Asia. This meant that cement could be transported from Asia to the US as back-haul. The economic crisis in Asia has changed this completely. Shipments from the US Continent in the direction of Asia have become much less frequent and cement transport out of Asia cannot depend upon low back-haul rates anymore. Despite the depressed shipping prices at the moment, the cost to transport cement from Asia to the US has actually increased.

When establishing a cement import operation it is extremely important that a long term outlook is prepared in respect to the shipping cost of cement, taking into account several possible economic scenarios.

The import terminal itself also faces a large number of restrictions that have to be taken into account. Most important is that a detailed study has been made in respect to the cement market situation. Projections have to be made for the overall cement consumption of the area over a number of years, taking into account several economic scenarios. Another factor worth considering is the possible addition of new cement production facilities that can serve the area or the possibility of import terminals by competitors. Very careful consideration has to be given to the port situation. The key feature in this respect is that an unloading dock must be found that has sufficient draft to receive the ships that can provide the lowest freight cost on the given trade route. Taking again the example of cement import on the US West Coast, selecting a port that can handle only 25,000 dwt ships means applying an immediate increase to transport costs, of approximately US$3-4pt in comparison with ships in the 35,000 - 40,000 dwt range. The dock situation itself is also important. When rails are available, using a shipunloader with a very high unloading efficiency is possible. When no rails are available a dockmobile unloader would be a good solution but would have higher capital and operational costs. When the dock situation is very poor, or if no dock exists then barge mounted unloading equipment can be used. But this will also represent a higher capital cost and a lower unloading efficiency. The site in the port should preferably be as close as possible to the dock. The further away the storage facility is located from the dock, the higher the capital cost and energy consumption of the unloading system. It is extremely important that the port and the storage facility site provide a good access for bulk trucks and, if required, trains for onward distribution. The labour union situation in the port is also important as this substantially influences the amount of control on the operation, as well as a possible increase in costs.

Nowadays, one of the most important restrictions that has to be overcome to establish a cement import operation is the environmental permit. Environmental permits have become increasingly difficult to obtain and can take as much as a year to complete. Moreover it is always subject to political influence. Cement terminals cause a change in existing market situations. Competitors will do their utmost (in general) to prevent new sources of cement coming onto the market. Blocking permits is frequently used to prevent new import facilities from starting-up.

Logistical and economical factors

Resolving the possible restrictions provides a financial framework for the project. Following this, logistical and economical factors have to be considered. The logistical factors provides us with the minimum and maximum requirements that are imposed on the equipment and storage facility of the import terminal. The economic factors consist of pure financial factors such as required payback time and return on investment, the interest rate and possible limitations on the size of investment. The other economic factors revolve around the cost of shipping and finding a balance between capital cost and operational costs of the import facility. Logistical and economical factors are best combined in spreadsheets that calculate the cost per ton depending on various configurations and annual throughputs.

Equipment and storage configurations

A wide range of equipment and storage facilities are available for cement import terminals. A review of this is provided in Figure 3. The most important decision is the choice of storage facility. The available types of storage are floating terminals, flat storage

Cement import operations: possible equipment and storage facility configurations

a) shipunloaders
- pneumatic or mechanical
- rail mounted
- barge mounted
- dock mobile
- road mobile

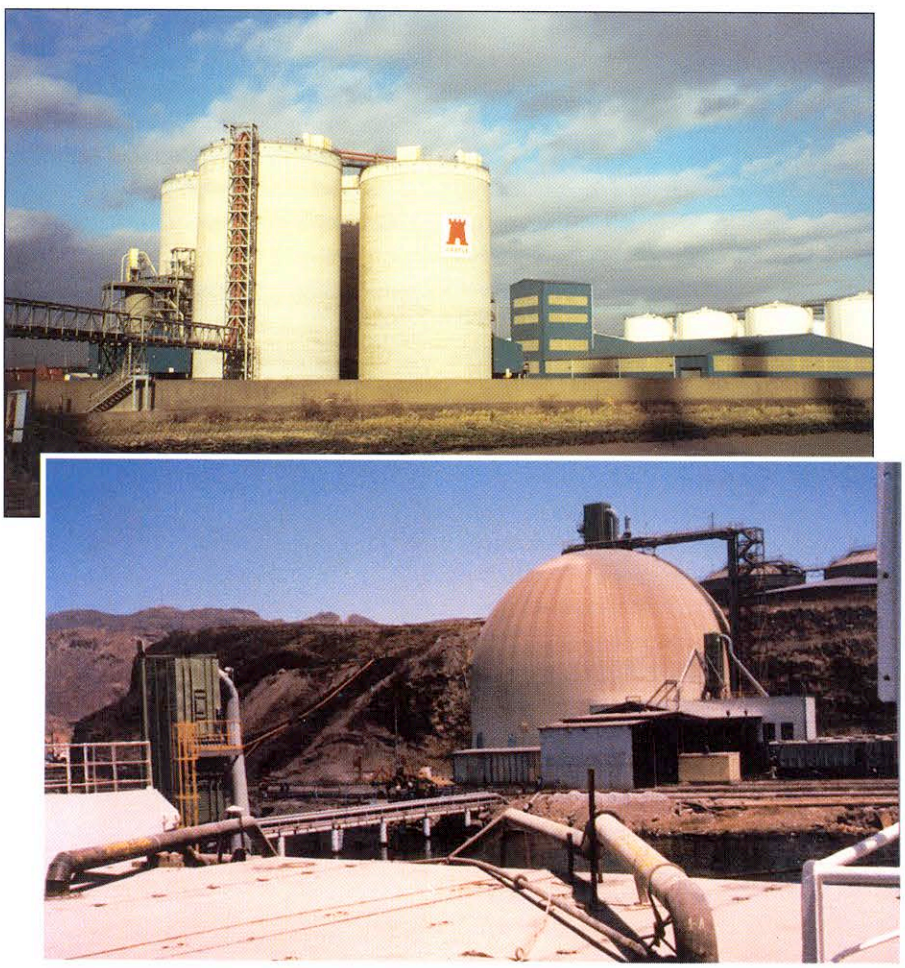
b) storage facilities
- floating terminal
- silo storage:
  - inverse cone
  - "flat bottom"
- dome storage;
  - fluidised floor
  - mechanical extraction
- flat storage;
  - conversion of old building
  - dedicated new building

c) distribution
- integrated or separate bulk truck loading stations
- fully, partially or non automated systems
- possible train or barge loading
- possible bagging plant.

Figure 3: Possible storage facility configurations.

terminals, dome terminals, and silo terminals. The selection of the type of storage facility is predominantly determined by the required payback period. Table 1 gives an example which shows the differences of various types of storage facilities in this respect. The example is again taken for import facilities on the US West Coast that would receive their cement from Asia. These facilities have typical sizes of between 50,000 - 60,000 tons of storage depending on ship size and annual throughput. They are equipped with shipunloaders in the 400-800tph range. The example is taken on basis of a steady throughput of 500,000tpa. However, the example illustrates the differences between the various types of terminals quite clearly. Floating terminals have a very high operational cost. For a terminal with a 50-60,000 tons capacity, the combined charter and operational cost would be in the range of US$10m per year. With a throughput of 500,000 tons per year this comes down to an operational cost of US$20.00 per ton. The floating terminal has the advantage though, in that it requires only a small investment. (The ship has to be transported to the port, mooring facilities have to be provided as well as truck loadout facilities with some infrastructure). The floating terminal, however, has a substantial advantage in that it can be operational in a very short space of time. When available, the vessel can be positioned immediately after approval of all permits. A shore based terminal would take at least a year to build. For import operations that are short term there is no better solution than the floating terminal. Only in situations where the imports are expected to last longer than three years is a shore-based terminal a better alternative.

The flat storage terminal, as noted in Table 1, is based on the conversion of an existing warehouse in the port. The overall required investment for conversion of the warehouse building, plus the addition of a large shipunloader and bulk truck loading facilities, would be approximately US$9 million. Facilities with a new storage building might be approximately US$1-1.5 million more expensive.



Top: Silo terminals require long payback periods so the dome silo (bottom) could be a more viable option with substantially lower capital costs and only slightly higher operational costs.

Cement import operations: possible restrictions and 'political' factors (risk assessment).

Cement source:
- stable supplier, financially sound
- continuous, correct quality
- long term supply available
- good loading facilities
- no ties to (possible) competition

Shipping:
- availability of ships on trading route
- long term outlook

Import terminal
- (long term) market availability
- port situation
  * draft
  * dock situation
  * site
  * access
- union situation
- (environmental) permit situation
- expected resistance of competitors

Figure 4: Possible restrictions and 'political' risk factors

The example shows that the operational cost of a flat storage facility is approximately US$7 per ton (including lease and overheads). The flat storage terminal has the capability to have a very short payback period and its overall profitability can be more than a floating terminal within a period of 2-3 years. The example also clearly shows why flat storage is such a preferred method for cement import operations. It combines a short payback period with excellent economics and has considerably better storage options. Flat storage however, is not always a possibility. Sometimes the large area required for the storage building is not available. Where labour situations are difficult, flat storage is less attractive. In such situations the dome terminal can provide a good alternative.

A dome storage facility of approximately 50,000t including shipunloader, truck loadout stations, etc has a typical cost of approximately US$14 million. Its payback period is still reasonable and its profitability after 4-5 years is getting close to the flat storage alternative. Dome terminals offer the possibility of completely automated terminal operations which make them insensitive to difficult labour situations. The example shows that silo terminals are not really an option for import operations. This payback period is too long for volatile import operations and the return on investment is poor.

A silo terminal is only an option in countries which import all their cement and have space restrictions in the port.

Cement Import Operation: operational costs versus investment payback period and R.O.I.

Simplified example at steady 500,000tpa throughput.

	Floating terminal	Flat storage terminal	Dome terminal	Silo terminal
Cement sales price per ton	$70	$70	$70	$70
Cost per ton:				
- CIF West Coast	$40	$40	$40	$40
- Operating cost terminal	$20	$7	$5.50	$5
- Delivery to customer	$5	$5	$5	$5
Gross margin per ton	$5	$18	$19.50	$20
Required investment	$1,000,000	$9,000,000	$14,000,000	$25,000,000
Payback period	5 months	1 year	1.5 years	2.5 years
Result after 1 year	$1,500,000	(*)	(*)	(*)
Result after 2 years (**)	$4,000,000	$0	$(4,250,000)	$(15,000,000)
Result after 3 years (**)	$6,500,000	$9,000,000	$5,500,000	$(5,000,000)
Result after 4 years (**)	$9,000,000	$18,000,000	$15,250,000	$5,000,000
Result after 5 years (**)	$11,500,000	$27,000,000	$25,000,000	$15,000,000
Result after 6 years (**)	$14,000,000	$36,000,000	$34,750,000	$25,000,000

(*) Floating terminals can be in operation fast. Shore based terminals need approximately one year to be built and commissioned
(**) Cumulative annual gross margins minus investment
Please note all figures are indicative only.

Table 1: Indicating the operational costs against the investment payback period

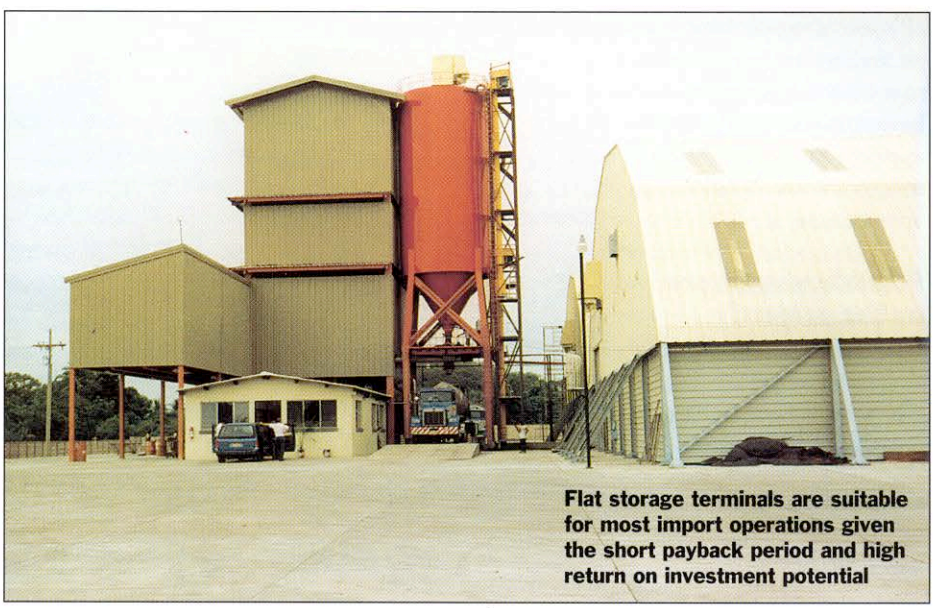
Conclusions

Cement import operations are a very specialised form of cement distribution. It requires expert knowledge that is very different from establishing and operating cement manufacturing facilities.

Detailed knowledge on cement trade and transportation provides the basis for cement import operations. The actual import facility has to reflect the conditions that trade and shipping impose on it and not the other way around.

Guidelines for establishing good import operations include:

- A forecast of cement consumption in the market area taking into account several scenarios. The role of local cement manufacturers and possible existing imports should be analysed including the volatility factor and price developments.
- A study has to be made on available cement sources and possible developments in respect to their ownership and price levels. A long term cement supply of consistent good quality has to be secured.
- A study has to be made in respect to short and long term shipping developments, taking into account several scenarios on world economy and general shipping situation.
- A port has to be found with suitable draft, dock situation, site, access and labour situation.
- Based on the above, the financial and practical constraints of the import operation should have become clear.
- Based on the logistical and economical factors, several terminal concepts have to be evaluated and a final concept decided on. The key is to focus on a payback period that reflects the expected volatility of the import operation and gives the best return on investment for that situation.
- Environmental permits are the biggest hurdle. Start applying during the feasibility study phase.
- Most import operations have a limited life span. Every month lost means a substantial loss of possible earnings. Worst case is a cement import terminal that is ready when the import cycle is over and has to wait idle for 3-5 years before the next cycle starts again. This still happens too frequently.



Flat storage terminals are suitable for most import operations given the short payback period and high return on investment potential