

# Loading Solutions

## Hans van Est, Van Aalst Bulk Handling, the Netherlands, provides an overview of the company's mobile pneumatic solutions for bulk loading cement.

In the past, Van Aalst Bulk Handling has delivered several fixed installations to provide reliable solutions for loading cement onto ships. However, the latest developments in shiploading favour flexibility and mobile installations. These allow other activities in the harbour to continue while loading, minimising the distribution caused. This article therefore focuses on pneumatic loading installations that can be temporarily installed on the dock.

At its heart, pneumatic ship loading of cement is nothing more than blowing cement into the holds. To prevent a lot of dust is escaping while doing so, the transport air must be extracted from the ship and cleaned before it is released into the open. Most of the cement, meanwhile, will drop to the bottom of the hold and the captured dust must be reinjected towards the loading pipeline.

To blow the cement towards the ship a cement pump or a convey unit, such as dense phase unit, is needed.

A cement pump has an entrance for the cement. From this entrance hopper the cement is internally transported to the mixing chamber of the pump, where the cement and transport air are mixed. This mixture is then blown into the ship.

Dense phase conveying, on the other hand, is executed by two transfer kettles. A reception hopper is mounted on top of the kettles, one of which is filled from this. Once the first kettle is filled, the flow of cement is directed to the second one. While kettle number two is filling, the content of kettle one is blown towards the ship. Filling and emptying in a dense phase unit take the same time, giving an almost uninterrupted loading cycle.

The investment cost for a pump is lower than for a dense phase convey unit. However, power consumption and wear of a pump is much higher.

Van Aalst Bulk Handling advises small loading terminals to use pumps, and terminals that handle larger amounts to use dense phase units.



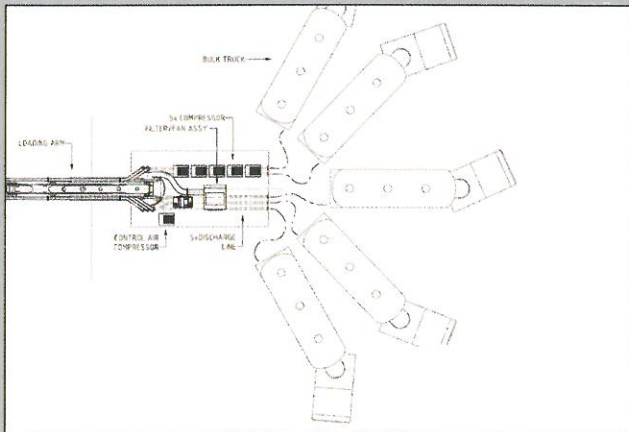
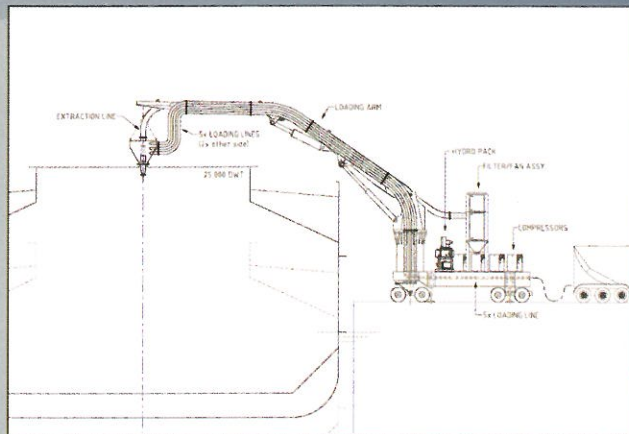
(figure 1) Mobile filter unit.

## Loading small ships

To load small ships, the pipeline from the storage can be connected to a hold hatch opening with a rubber hose. This flexible hose can follow the movement of the ship, which will lie lower in the water when it is filled.

A mobile filter (Figure 1) can be positioned on the dock next to the ship. This can connect to the same hold, also with a flexible hose, and extracts the transport air out of the hold and filters it before it is released into the open. In fact, the filter unit extracts more air than the transport air and creates a slight under pressure in the hold to ensure no dust will escape via chinks between hold and hold cover. This filter is self-cleaning. Pulses of air that are injected in the filter elements in the opposite direction of the airflow release the dust caked on them. The caked dust drops down and is reinjected in the cement loading line via a pressure pot.

The system described above is possible on small ships where the hoses are not too long and are relatively light weight. On bigger ships, however, the hoses become so heavy that they are difficult to handle.



(figure 2) Van Aalst loading trailer schematic: a) general lay-out and b) top view (below)



**VAN AALST  
BULK HANDLING**

made to measure



Using a crane, meanwhile, often results in knicks in the hoses, which reduce the loading capacity. Another disadvantage of the hoses is the fact that they move under influence of the airflow inside. This movement reduces the loading capacity because the force used to move the hose is not available to transport cement. Van Aalst Bulk Handling's loading trailers (Figure 2) can overcome these negative influences. The loading arm on the trailer lifts the cement loading line as well as the air return line onto the ship. Therefore no manual handling is needed.

Furthermore, the loading arm is also support for the hoses, so that they move less and the loading capacity is kept high.

The loading arm is hydraulically operated and has an automatic following device. When the ship lowers as it is loaded, the loading arm will follow this movement.

Figure 3 shows a unit that had to contend with high waves in the harbour. This increased the lateral and horizontal movement of the ship, which was a bit too much for the arm to follow. This unit therefore has had a longer flexible hose added between loading arm and ship.

The filter/fan assembly is also mounted on the trailer. Depending on the availability of electricity in the harbour, the trailer can be equipped with a generator. When no auxiliary air of the right quality is available, a compressor with air dryer and buffer tank can be installed.

To move the loading trailer from hold to hold, the wheel sets can be self propelled. Hydraulic power for this is available for the loading arm. During movement, the flow of oil can be directed to hydraulic motors on the wheel sets, so that no pulling truck or manpower is needed to go from one hold to the other.

After loading the trailer can be moved to a parking spot and the dockside will be available for other activities.



(figure 3) Loading trailer adapted for rough loading conditions.

### No harbour storage

If no storage is available in the harbour, the cement will enter the harbour in tanker trucks.

These can be used to load the ships in combination with the loading arm on a trailer.

In this case, however, more than one loading lines are mounted on the arm, as in Figure 2. The loading lines enter into a cyclone where cement and transport air are separated.

The biggest disadvantage of the tanker trucks is the small size of their unloading compressor. Because of this, it takes 30 to 45 minutes to empty the truck into the ship.

However, Van Aalst Bulk Handling has installed compressors on the trailer that have a larger capacity and can unload the tanker trucks in 12 minutes. Four trucks of 30 tons capacity can be unloaded in one hour per connection, giving the unit in Figure 2 a loading capacity of 600 tons per hour.

To achieve this capacity, though, enough tanker trucks must be available. This can be a problem, and to overcome this Van Aalst Bulk Handling has supplied a system that allows cement delivery by tipper trucks.

The system operates on the Canary Islands. Clinker arrives in the harbour and is transported to a grinding mill in Tenerife by tipper trucks, with cement transported back the same way.

Taking clinker to the mill, the tipper can be closed off with hydraulic operated cover doors to prevent dust escaping. These doors have manholes installed through which loading bellows in the grinding factory can load the (enclosed) tipper. It can then take cement back to the harbour.

Once it gets there, the Van Aalst Bulk Handling system consists of a special hopper recessed in the harbour area. This has an enclosed cover on which filters are mounted. The trucks dump the cement in the hopper and a flap system in combination with the fans ensures that no cement dust can escape the hopper (Figure 4). A suction/blow dense phase system then transports the cement from the receipt hopper to the trailer with loading arm or to storage in the harbour. It is a multifunctional, cheap and flexible solution that is easy to operate – just what conveyance systems should be.



(figure 4) Tipper truck hopper system.

## VAN AALST BULK HANDLING BV

(International Trade Centre) Engelandlaan 56  
 2391 PN Hazerswoude-Dorp - The Netherlands

[www.vanaalstbulkhandling.com](http://www.vanaalstbulkhandling.com)

Head office:

tel: +31 172 213 341 fax: +31 172 232 804  
 e-mail: [info@vanaalstbulkhandling.com](mailto:info@vanaalstbulkhandling.com)

USA, Van Aalst Bulk Handling Co:

tel: +1 402 362 615 3 fax: +1 402 362 715 3  
 e-mail: [dgeorge@vanaalstbulkhandling.com](mailto:dgeorge@vanaalstbulkhandling.com)