

Panama's floating terminal

Changuinola Civil Works JV has established a floating cement terminal in the Changuinola River, Panama, specifically designed to ensure a constant supply of cement and fly ash for the construction of a new dam. Van Aalst Bulk Handling was awarded the contract for the terminal's shipunloader, and in this article the company details some of the key features of this special project which has recently become operational.

Changuinola Civil Works JV is the contractor for a 214MW hydroelectric facility 200 miles northwest of Panama City. For this power plant situated in the province of Bocas del Toro, a large concrete dam needs to be erected in the Changuinola River. To receive the cement and fly ash for this dam, Changuinola Civil Works has converted a large barge into a floating terminal. The main reason the company decided to opt for a floating cement terminal was because of the lack of available space in the Port of Almirante to store large quantities of cement and fly ash.



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Ensuring constant supplies

A constant supply of cement and fly ash for the dam is crucial. Interruptions in the supply of concrete towards the dam construction can result in "cold joints" which are very expensive. High volumes of stored cement and fly ash can prevent such interruptions, and thus a floating terminal turned out to be the optimum solution.

The floating terminal is designed to receive all kinds of cement and fly ash ships including:

- Standard bulk carriers up to 7000dwt
- Pneumatic self discharging cement carriers
- Mechanical self discharging cement carriers.

This highly-flexible approach also ensures supplies will remain constant and not be influenced by the non-availability of specialized cement carriers.



Van Aalst order

Van Aalst Bulk Handling was selected as the supplier of the shipunloader on account of the company's ability to be both competitive and provided a tailor-made solution in close cooperation with Changuinola Civil Works JV. Over the years Van Aalst Bulk Handling has delivered several unloaders for floating terminals and it is well equipped to select the right technology for this (very special) type of terminal.

Shipunloader functions

The Van Aalst Bulk Handling shipunloader on the terminal has two functions:

- Unloading the floating terminal and to pump the unloaded cement or fly ash to "small" silos in the harbour
- Unload incoming bulk carriers with cement and fly ash and distribute/load the floating terminal with these materials.

To be able to unload all the holds of the floating terminal as well as the incoming supply ships, the shipunloader is mounted on a gantry which can travel up and down the total length of the floating terminal. The floating terminal and the gantry were constructed in Central America, and the shipunloader in The Netherlands. Upon Changuinola Civil Works JV special request, the unloader was constructed in modules which fit in containers. This allowed easy and low cost transportation but most importantly, assembly of the unloader could be carried out with the only available (container) crane at the construction port.

The unloader is diesel-driven and needs no power supply or instrument air from the terminal or shore. It is an independent machine which can be operated 24 hours a day.

Shipunloading process

The shipunloading process is an almost fully-automated procedure which requires little input from the operator. The shipunloader's complete procedure and safety features are controlled by a PLC (Programmable Logic Controller). The operator's manual tasks are limited to the starting and stopping of the diesel drive motors and operation of the suction arm.

The material inside the hold of the supply ship, or in the hold of the floating terminal itself, is picked up by a special suction nozzle. The shipunloader is equipped with an hydraulic operated unloading arm which is used to manipulate this suction nozzle through the material.

The suction nozzle is hydraulically-operated and has a low speed cutting head, which loosens and fluidises the (packed) material.

With proper fluidising, it is easier to pick up the cement or fly ash while at the same time the stresses in the hydraulic-operated arm construction will be reduced as the force required to move the nozzle through the material is reduced significantly by the suction nozzle. The shipunloader's electrical system is supplied by a generator which is belt driven by one of the diesel motors.

All electric control equipment is housed inside the electrical switchboard. This switchboard contains all the necessary switch gear, etc. that is required for the correct operation of the machine. The PLC control system is also located in this panel.

For operators who have difficulties working with systems like the PLC, the panel is also equipped with indication lights and pressure indicators on the outside of the control panel doors. With these features the operator can see the status of the unloading/transport process and also the vacuum pump and compressor.

During standstill periods, the controls of the panel are protected by an aluminum cover plate. In operating conditions, this cover lifts upward to form a shelter and sunroof.

Two transfer kettles are installed through which the cement and fly ash are sucked out of the holds and blown to the silos on shore. A filter system is fitted in each vessel to separate the cement fly ash from the suction air. The filter systems are sized for the maximum capacity of the unloader and have dust emissions of less than 5mg/Nm³ of air. This value is much lower than the dust emission norms which are valid for industrial zones in Europe. Each kettle is also equipped with Hurricane aeration system-newly-developed by Van Aalst Bulk Handling. This system ensures that more cement can be transported with the same amount of transport air compared to systems which use aeration pads in the transfer vessel. No aeration pads are needed in the Hurricane aeration system which reduces maintenance costs as well as down time.

The piping arrangement of the shipunloader is designed for efficient transport of the cement and fly ash. All pipes on the unloader are kept as short as possible and are arranged to minimise interruptions in the flow of material. All selected materials have proven their reliability in the transport of abrasive material like cement and fly ash.

Butterfly valves are fitted throughout the system for the control of the unloading cycles. These valves have a vulcanised EPDM lining for a perfect seal. The valves that are fitted in the convey air piping are exposed to high wear, due to this reason, specially designed pinch valves are installed which have a long lifetime. When the valve has eventually worn out, only the inner part of the pinch valve needs to be exchanged, this can be done simply and reduces maintenance costs.

All in all, the shipunloader encompasses all the latest features developed by Van Aalst Bulk Handling, designed to reduce both power consumption as well as maintenance costs. The unit was commissioned in December 2009 and has been in operation since early 2010.