Self-Discharging Cement Carrier

Along a river in Germany, mobile unloading

Saudi Arabia, mobile unloading

Bamberg, Germany, stationary unloading
Advanced IBAU technology for self-discharging Cement Carriers

The trade of cement and similar products results in new ship capacities and more and more conversions of conventional bulk carriers into specialised cement self-unloaders. Self-unloading cement carriers need no shore based ship unloading equipment and have a totally enclosed cargo handling system, using a fluidized system in the cargo holds for cement unloading. Up to now, the world fleet comprises about 300 units between 1000 dwt and 60000 dwt for seaborne cement transportation. Additionally, about 200 units exist in the <1000 dwt range for lake and river transport.

In line with the market demand, IBAU HAMBURG has developed concepts for new builds as well as the conversion of bulk carriers into cement self-unloaders, which can be adapted for ship sizes up to 60000 dwt. Especially the cement carriers in the upper range require advanced systems, which are fully automated and possible to achieve high loading and unloading rates.

Fluidizing cargo holds

The sloped bottom of the cargo hold are covered with fluidizing panels. Rotary piston blowers supply the panels with oil-free compressed air and make the cement flow to the lowest point, where the discharge gate is installed. The discharge rate is adjusted by an IBAU FLOW CONTROL GATE.

The most advanced mid ship tunnel concept – from IBAU Hamburg

The mid ship tunnel system is dividing the cargo holds into a portside and starboard compartment. The IBAU pumps and rotary piston blowers are placed in the mid ship tunnel. The mid ship tunnel eliminates an additional bottom to deck hold for the discharge equipment.
Advanced self-unloaders in the 1000 dwt to 6000 dwt range are equipped with fluidisation systems in the cargo holds. The systems can be installed in new builds and conversions within three months. They can be adapted to the different ship sizes and different types of cement, fly ash or similar materials.

Unique in the IBAU concept is the space saving mid ship tunnel design that integrates the discharge equipment and divides the holds into a portside and starboard compartment. The mid ship tunnel eliminates an additional bottom to deck hold for the discharge equipment.

The fluidisation system comprises inclined aeration panels, which cover the complete hold bottom. Cement flows to the lowest points in the holds, where IBAU flow control gates are installed, which allow an adjustable and computerised flow. For transporting the cement from the holds to the shore terminal, special designed screw pumps are used, which have a very low feed point and allow a lateral feed from left and right hand side. Each pump transports up to 350 t/h cement. Conveying distances of more than 600 m can be achieved.

When different cement types such as white and grey cement have to be transported one after another with the same cement tanker a 100% cement reclaim from the cargo holds is required. The innovative IBAU vacuum cleaner assists the reclaiming process, to make a 100% cement reclaiming rate possible. The cargo holds are equipped with docking stations for the mechanical cleaner, which directs the remaining cement between aeration panels into the bin of an IBAU pump. Particle separation is effected in the pump filter and no additional cement transportation equipment is needed.

The self-unloader is loaded and unloaded in the most flexible and simple way by mean of IBAU pumps. To achieve unloading rates of up to 1200 t/h, four IBAU pumps can be used in parallel. The pumps are supplied with oil-free conveying air by screw compressors, which are located in deck houses, together with the filtering equipment. For direct loading with high capacities again IBAU screw pumps are used, which pneumatically convey the cement through one or more pipelines directly into the cargo holds.

Flexible hoses for the connection of the shore and ship pipes are carried by an on-board crane. Loading lines on deck are equipped with motor actuated IBAU two way valves for directing the cement into the selected holds. The required compressed air is generated by the compressors on board. For cement distribution on deck from a central receiving bin either fluid slides or horizontal screws can be used. IBAU fluid slides are used for capacities up to 1200 t/h, while IBAU screw conveyors are recommended for capacities up to 500 t/h. Such systems are very common if a mechanical ship loader is used.

For highest reliability, cement loading and reclaiming for the self-unloader can be completely automated and computer controlled. During loading, cement is automatically directed into the holds, while the ship is balanced. Unloading rates can be pre selected and the operator gets information about any hold and discharge equipment at any time. IBAU HAMBURG can fit the computer systems with latest state-of-the-art technology to ensure highest possible through the hold capacity with the shortest lay time for the ship in port.

The described loading / unloading technology optimal assists computer automation.

How it works:

Cement Carrier loading/unloading

IBAU’s new generation of Cement Carrier technology M.V. KEDAH Westport
The drawing shows the general layout of the cement tanker M/V GOLIATH (15,000 dwt).

1. Crane for carrying the flexible loading and unloading lines
2. Loading lines on deck
3. Deckhouses with 4 filters and exhaust fans
4. Deckhouse with 8 compressors
5. Four cargoholds divided by midships tunnel into star and portside compartment
6. Four IBAU pumps and 8 rotary blowers placed in the midships tunnel
M.V. GOLIATH board crane lifting the loading pipes

M.V. GOLIATH loading procedure for dustfree loading independent from any weather conditions
Cement Carriers

The drawing shows the general layout of the cement tanker M.V. KORALIA (8,500 dwt).

1. Crane for carrying the flexible loading and unloading lines
2. Loading lines on deck
3. Deckshouses with filters and exhaust fans
4. Deckshouses with compressors
5. Four cargoholds divided by a midships tunnel into star and portside compartment
6. Four IBAU pumps and rotary piston blowers placed in the midships tunnel

M.V. KORALIA cement carrier

M.V. KORALIA reaching one supply depot

The drawing shows the general layout of the cement tanker M.V. KORALIA (8,500 dwt)
Cement Carriers

M.V. KEDAH I
Cement supply on the open sea

M.V. KEDAH II
in the dry dock

M.V. KEDAH III
during one of the supply voyage

The drawing shows the general layout of the cement tanker M.V. KEDAH I, II & III (16,000 dwt)

1 Loading fluidslides
2 Deckhouses with filters and exhaust fans
3 Deckhouses with compressors
4 Four cargoholds divided by a midships tunnel into star and portside compartment
5 Four IBAU pumps and rotary piston blowers placed in the midships tunnel
M.V. MARGARETA unloading at Hamburg Harbour

The drawing shows the general layout of the cement tanker M.V. MARGARETA (2,200 dwt)

1. Loading points on deck
2. Deckshouses with filter and exhaust fan
3. Deckhouse with compressors
4. Cargoholds divided by a midship into star and portside compartment
5. IBAU pump placed in the midships tunnel

The drawing shows the general layout of the cement tanker M.V. MARGARETA (2,200 dwt)
M.V. CEMSEA terminal at Rostock harbour

The drawing shows the general layout of the cement tanker M.V. CEMSEA (4,100 dwt)

1 Loading points on deck
2 Deckhouse with compressors
3 Cargo holds divided by a midship into star and port side compartment
4 Horizontal screw conveyor placed in the midship tunnel
5 IBAU pump placed in the midships tunnel

The drawing shows the general layout of the cement tanker M.V. CEMSEA (4,100 dwt)
Cement Carriers

M.V. CEMSEA and M.V. CEMSTAR during supply voyage
Preparation for discharge

M.V. CEMSEA at the Kiel channel

M.V. CEMSEA cement supply by HOLCIM
Cement Carriers

Why IBAU pumps work better:

The IBAU pump is the only direct unloading solution that does not need any intermediate transport and the space requirement in the ships hold is very low. Vacuum systems as well as screw systems mainly are combined with pressure vessel conveying for ship to shore transport. The capacity range of IBAU pumps installed in parallel is as high as with the most advanced screw conveyor systems. The conveying distance can be up to 600 m, which covers the known terminal requirements. Here, screw systems have their main disadvantage.

The specific power consumption that is required for an IBAU pump is not higher than for a combined vacuum/pressure vessel system and on ly slightly above screw systems for medium and long distance. Another strong point of the IBAU pump is the adaptability to latest automation requirements. When screw conveying systems are combined with IBAU pumps some special advantages are received compared to the vacuum / pressure vessel solution, such as lower energy requirements and the long conveying distance.

Conclusion

The concepts of IBAU HAMBURG are driven by the market needs. Conversions have to become operational within three month. Advanced systems have to fit to the terminal facilities and require high loading/unloading rates up to 1200 t/h. These can very effectively be met with the IBAU pump system, which fulfills the most stringent system requirements. The direct loading/unloading mode requires no intermediate transport and transfer points as it is necessary with vacuum / pressure vessel systems. Another major advantage is the possible long conveying distance and the possible complete automation. The system can also be adapted to cement tankers, which alternatively transport different cement types. IBAU HAMBURG has an intensive project experience. For smaller ship sizes such as river barges also mechanical screw conveyors are economical.
The cement barge reaching the unloading station

The cement barge of LAFARGE Cement during the voyage on the river Seine

UPPER DECK

1 Feding screw conveyor
2 Two cargoholds
3 Discharge screw conveyor
4 Flexible screw conveyor for unloading

The drawing shows the general layout of the cement barge (2,200 dwt)
Loading station for Lafarge at Le Havre port
Cement Carriers

The drawing shows the general layout of the cement tanker M.V. BIG ONE (60,000 dwt)

1. Crane for carrying the flexible loading and unloading lines
2. Seven cargo holds divided by midships tunnel into star and portside compartment
3. Seven IBAU pumps placed in the midships tunnel
4. Deckhouse with compressors

The drawing shows the general layout of the cement tanker M.V. BIG ONE (60,000 dwt)