

Mobile ship loading solutions for ports and terminals

Aumund Group, Rheinberg, Germany

Over the last 25 years B&W Mechanical Handling Ltd. of England (now part of the Aumund Group of Germany) has pioneered the application of sophisticated mobile solutions for ship loading and stacking operations in ports and terminals.

In the early days the mobile shiploader tended to be just a simple mobile conveyor used for loading small coasters in river berths at relatively low handling rates.

Over the intervening years the market has changed and the mobile solution has steadily become the preferred solution in many locations from the arctic to the equator.

Shiploader evolution

B&W entered the shiploader market with their established 'Loadmaster' series mobile conveyors (illustrated in Figure 1), used in smaller ports and river berths for exporting free flowing material such as grains and fertilisers delivered direct to the port in tipping trucks.

This equipment could only handle free flowing materials that could be discharged from the trucks via the small 'Grain-Door' in the trailer tailgate such that the flow could be controlled to avoid spillage.

At the same time B&W were also producing an early variant of what is now known as the Samson surface feeder for the agricultural industry.

Known as the 'Stormatic' system this early surface feeder was designed to receive mainly root crops direct from farm trailers and provide soft handling and a controlled discharge rate to the following conveying installation.

It was soon realised the 'Stormatic' concept could be applied in ship loading applications enabling the system to handle cohesive materials by accepting truck discharge from the full tailgate thus expanding the range of application to almost any material type.

To differentiate the 'industrial' version of the feeder from its 'agricultural' brother it was decided to re-brand for all markets outside agriculture and hence the Samson surface feeder was born.

An early application can be seen handling China-Clay (Kaolin) where Kaolin is received from tipping trucks using a mobile Samson feeder and discharged to an existing mobile shiploader at the Port of Parr in Cornwall (see Figure 2).

Following market demands for high capacity mobile stacking equipment B&W realised the same concept could be applied and as a result the 'Stormajor' was developed by combining a Samson feeder with a radial stacking boom as a complete and integrated machine (see Figure 3 handling raw sugar into temporary storage).

This concept has been further developed over the years and utilised in addition for barge and railcar loading.

In the north of Russia the largest ever B&W Stormajor loads Gabbros direct from both loading shovels and tipping trucks into large river barges, typically around 5,000 tonnes and at a rate of 700 t.p.h..

In this operation the equipment is located on a large lake close to the small town of Sheleki which is between St. Petersburg and Murmansk (see Figure 4).

The Gabbros is crushed down on site to various grades suitable for use as aggregate in concrete or road building and shipped



Figure 1. 'Loadmaster' series mobile conveyors.



Figure 2. Kaolin is received using mobile Samson feeder and discharged to an existing mobile shiploader.



Figure 3. Integrated Samson feeder with stacking boom handling raw sugar into temporary storage.



Figure 4. Largest ever B&W Stormajor as seen in Sheleki, Russia.

primarily to both St. Petersburg and Moscow where hard stone is not readily available locally.

With its cantilevered radial outloading boom the Stormajor is ideal for loading barges from a lake or river berth using its long outreach to span out to the barge moored to dolphins just off shore.

As illustrated in Figure 5, the Stormajor comprises a Samson surface feeder unit plus a radial and luffing outloading boom both mounted to a common mobile chassis as a single autonomous unit.

The Samson feeder will receive most bulk materials direct from tipping trucks, dump trucks and/or loading shovels.

The stormajor today

The Stormajor has been in continuous development for 25 years now with the early machines supplied almost exclusively for grain handling, ship loading and storage.

For example a unit supplied in 1993 to La Dauphinoise in central France receives cereals from tipping trucks for loading to storage, and a second machine of almost identical specification was supplied in 2006 for the same duty.

Over the last 25 years the Stormajor has evolved into a multi-purpose loading tool equally suited to small storage operations through to major installations handling very heavy and abrasive materials.

Düsseldorf

The latest evolution of the design is illustrated here at the port of Düsseldorf handling iron ore transhipped from barges to railcars, (see Figures 6).

The iron ore is taken by grab crane direct from the barges and transferred to the extended Stormajor receiving hopper.

Using the Stormajor radial outloading boom fitted with a rotating trimming chute the iron ore is transferred direct to railcars.

This unit in Düsseldorf has two unique features; it is the first Stormajor designed for receiving from a grab crane and it is also the first Stormajor to be supplied with a weighing system mounted to the outloading boom to check the weight of material loaded to each railcar.

Goa

Remaining with iron ore, the Stormajor solution has been chosen by Salgoacar Mining Industries (SMI) of Goa (India) to load locally mined ore into barges to be taken down river to a deep sea transhipment facility moored offshore.

Six Stormajor units have been supplied to SMI incorporating an extended Samson feeder unit to receive from three tipping trucks simultaneously, achieving the design loading rate of 1,250 tonnes per hour.



Figure 5. The Stormajor with surface feeder and outloading boom.

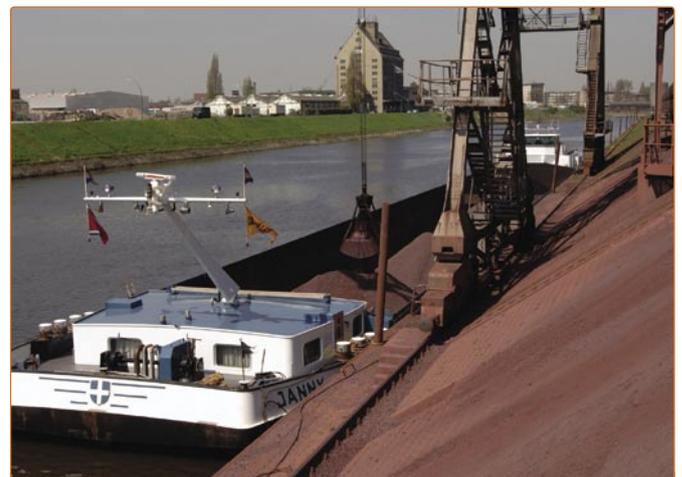


Figure 6. The latest evolution of the Stormajor handling iron ore.



Figure 7. Handling Kaolin at 1,000 tonnes per hour direct from tipping trucks.

In addition to the Stormajor units SMI have also taken delivery of two B&W mobile shiploaders designed for loading direct to Panamax sized vessels at a spot loading rate of 2,000 tonnes per hour.

New delivery orders from 2006 the Stormajor include Group CICE in Mexico, handling fertilisers, and Dolphin Energy of Qatar handling Sulphur.

Samson surface feeder

These projects would not have been possible without the benefit of continuous development of the Samson surface feeder concept from the original machines developed in agriculture to the latest Samson 1600 Series able to receive heavy ores direct from large mining dump trucks.

By applying the Samson surface feeder to the mobile shiploader concept, the ability to load ships direct from trucks without the need for large ramps or permanent excavations has enabled clients to realise export opportunities with minimum total investment and risk.

A machine such as illustrated in Figure 7 handling Kaolin at 1,000 tonnes per hour direct from tipping trucks enables existing berths to be used with maximum flexibility.

Also, by incorporating dust control features such as the 'Cascade' loading spout also illustrated in the picture, dust pollution may be controlled from the tipping point down to the vessel hold.

In these situations the Samson principle is ideal in that not only will the Samson handle most types of bulk cargoes, it does so with absolute minimum dust generation thanks to the wide apron belt technology.

As illustrated in Figure 8, the Samson surface feeder receives materials direct from the truck with the minimum of material fall.

By minimising the material free fall particulate separation is practically eliminated, thus dust generation is virtually eliminated at source. Therefore, in most applications, expensive dust control systems are not required and even the dustiest cargoes, such as cement clinkers, where extraction cannot be avoided, the level of dust extraction required is significantly reduced thereby reducing capital and operating costs.

Environmental pollution is a key factor in all new port installations and the Mobile shiploader as a concept has successfully addressed this issue whilst remaining competitive and efficient.

New projects

In the 25 years since the first B&W mobile shiploader was delivered to the port of Kings Lynn in England, around 80 units of varying sizes, from 15 metres to 55 metres in length with handling rates from 300 up to 2,000 t.p.h., have been produced for ports and terminals worldwide.



Figure 8. The Samson surface feeder keeps material spillage to a minimum.

Important new orders from 2006 for smaller sized machines are in progress for Yen Bai Cement in Vietnam, handling limestone and BetonCem in Italy, handling cement clinker.

For SAQR Port Authority in the United Arab Emirates two very large shiploaders of boom length 50 metres are presently in progress. These enormous machines are fitted with twin Samson feeder units enabling two trucks to be discharged simultaneously to achieve a spot loading rate of 2,000 t.p.h..

Also included are powered travel systems and a telescopic and rotating trimming spout system for vessel trimming are provided to further speed the loading operation by reducing the trimming time. An onboard diesel gen-set is provided to power the complete equipment making the machines fully autonomous independent of shoreside power supplies.

The machines for SAQR Port are to be supplied with both in-line and parallel powered travel equipment allowing the shiploader to be travelled along the vessel to minimise trimming delays.

The application of the Samson feeder either as a single unit or in twin configuration enables the equipment to handle cohesive materials without risk of bridging or blockage since the Samson discharges at 90 degrees to the shiploader conveyor.

For the control of these huge machines including sophisticated multidirectional powered travel systems, an operator's cabin is provided including a control desk with PLC validation of operator commands.

In this manner the operator can select the required operating mode and the control system automatically sets the wheel orientation and the function of the single lever 'Joystick' travel controller.

These new projects represent the pinnacle of the mobile shiploader development thus far, raising the benchmark for mobile solutions as a realistic but flexible alternative to fixed port installations.

Integration of B&W

However, this is not the end of the B&W story. In June 2002 the company was acquired by the Aumund Group of Germany. The integration of B&W into the Aumund Group has opened opportunities to develop the B&W surface mounting and mobile handling solutions worldwide.

At the clinker export terminal in Saudi-Cement, Dammam, a combination of fixed and mobile equipment provides the client with the required performance and satisfies the demands of the port operator for flexibility in berth utilisation. Material is received by railcar to under rail hoppers using Aumund feeder equipment, and then transferred to dome storage by belt conveyor and extracted by the industry standard Aumund KZB pan conveyors.



Figure 9. Samson surface feeder receives coal and pet-coke direct from tipping trucks.

A B&W 'Kleen-Line' reversing shuttle conveyor then discharges at the berth to a B&W mobile shiploader. In this manner the shiploader may be travelled off the berth when not required for clinker export, freeing the area for other port activities.

Returning to the first project discussed in this article where Link Conveyors are employed to transfer material from a shore side Samson feeder installation, this solution may be used on a conventional quay where material must be transferred from a fixed point to a mobile shiploader.

Similar units include full multi-directional powered travel facilities to enable the equipment to be easily and rapidly positioned for moving between vessel holds and for hold trimming.

This mode of operation retains the flexibility of the mobile shiploader concept enabling the berth to be cleared of equipment after each bulk vessel is loaded thus freeing the area for other duties, export or import, for maximum berth utilisation.

Conclusion

In today's volatile international market the mobile solution enables shippers to maximise on the value of short term market positions with minimum investment in fixed port equipment or infrastructure.

By eliminating fixed equipment, berth leasing costs can be mitigated, and should the shipper require it, the equipment can be easily uplifted and moved to another berth or even another port to suit trade conditions.

In addition to mobile solutions, B&W have developed the Samson surface feeder concept for fixed installations; of particular interest for the import of dry bulk cargoes which have to be moved by truck for off berth storage.

Illustrated in Figure 9 a Samson surface feeder receives coal and pet-coke direct from tipping trucks coming from the local port of Carboneras in Spain.

In this operation the fuel is discharged from handy sized ships using grab cranes and transferred direct to the tipping trucks which operate on a merry-go-round basis with a truck frequency of three minutes equivalent to an average handling rate of around 500 tonnes per hour.

From the Samson, the fuel is transferred by belt conveyor to an external storage area.

Whilst in this application the Samson feeder is not mobile as such, the concept of surface mounting enables the equipment to be simply installed on a flat concrete base eliminating any need for deep pits with the associated expensive civil works. Surface mounting simplifies equipment location and allows easy relocation to suit plant and project development.

Naturally for maximum flexibility the fuel may be stockpiled using the fully mobile B&W Stormajor, eliminating the need for any fixed plant or permanent civil works.

So in conclusion, after 25 years of development now combined with the benefit of integration to a substantial and respected international group, the B&W mobile and surface mounted solutions for ports and terminals have reached maturity.

ABOUT THE COMPANY

The **Aumund Group** of companies combines the expertise and products of Aumund Fördertechnik, Schade Lagertechnik and B&W Mechanical Handling. The comprehensive equipment portfolio covers all aspects of bulk material handling and storage in all major process industries.

ENQUIRIES

Mr. Matt Jones
 B&W mechanical Handling Ltd.
 Gemini House, Bartholomew Way
 Ely, Cambridgeshire
 UK
 Tel: +44 1353 665001
 Fax: +44 1353 666734
 Email: sales@bwmech.co.uk