



AUMUND Group
Saalhoffer Str. 17
47495 RHEINBERG
Germany

Editorial

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Bulk Port Technology – 2007

Mobile Ship Loading Solutions for Ports and Terminals

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...



Illustrated above in Greenland a combination of mobile *Shiploader* plus *Link Conveyors* handle Olivine rock direct from tipping trucks and shovels to Handymax vessels moored to dolphins on a deep water onshore berth.

The *Mobile Shiploader* is mounted to a new simple jetty arrangement requiring the absolute minimum investment in fixed port infrastructure and civil works.

B&W entered the *Shiploader* market with their established "Loadmaster" series mobile conveyors, illustrated in figure 2), 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, see figure 3).



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 is illustrated in figure 3) 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 4).



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 5) 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 tons 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 6).

The Gabbros is crushed down on site to various grades suitable for use as aggregate in concrete or road building and shipped 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 7) 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* has been in continuous development by B&W also for 25 years now with the early machines supplied almost exclusively for grain handling, ship loading and storage.



For example the unit as illustrated in figure 8) supplied in 1993 to La Dauphinoise in central France receives cereals from tipping trucks for loading to storage, a second machine of almost identical specification was supplied this year (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.

The latest evolution of the design is illustrated here at the port of Düsseldorf handling iron ore transhipped from barges to railcars, see figures 9), 10) and 11).



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 grab crane and also it is 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.

Remaining with the 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 transshipment facility moored offshore.



Figure 12

Illustrated in figure 12) during commissioning; one of six *Stormajor* units supplied to SMI incorporating an extended *Samson* feeder unit to receive from three tipping trucks simultaneously to achieve the design loading rate of 1,250 tonnes per hour.

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.

For 2006 delivery new orders for the *Stormajor* are in progress for Group CICE in Mexico handling Fertilisers and Dolphin Energy of Qatar handling Sulphur.

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.



Figure 13

A machine such as illustrated above 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.



Figure 14

As illustrated in figure 14) the *Samson* surface feeder receives direct from the truck with the minimum of material fall.

By minimising the material free fall particulate separation is practically eliminated and there dust generation is virtually eliminated at source.

Therefore in most applications expensive dust control systems are not required and even with the dustiest cargoes, such as cement clinker for example 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.

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.

For 2006 important new orders 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..

Plus... 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.

A very recent new order for the Goldfields Cerro Corona project in Peru, comprising an integral *Samson* surface feeder plus Mobile *Shiploader* of 35 metres length to load typically to vessels of 25,000 DWT at a peak loading rate of 900 tonnes per hour handling both copper and gold ores.

The machines for SAQR Port and Goldfields 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; see figure 15) similar design.



Figure 15

The application of the *Samson* feeder either as a single unit or in twin configuration as illustrated in figure 16) enables the equipment to handle cohesive materials without risk of bridging or blockage since the *Samson* discharges at 90 degrees to the *Shiploader* conveyor.



Figure 16

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, see figure 17) as a typical example.

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.

However, this is not the end of the B&W story since in June 2002 the company was acquired by the Aumund Group of Germany, a high respected and substantial international organisation incorporating the Aumund Fördertechnik Company plus Schade Lagertechnik also 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.

With daughter companies or representative offices in China, Hong Kong, India, Brazil, Switzerland, Poland and the USA plus manufacturing companies in Germany and the UK the Aumund Group are very well placed to deliver first class service close to their clients.

At the clinker export terminal of Saudi-Cement in Dammam a combination of fixed and mobile equipment gives the client the required performance and satisfies the demands of the port operator for flexibility in berth utilisation, see figure 18).

In this project material is received by railcar to under rail hoppers with Aumund feeder equipment, transferred to Dome storage by belt conveyor and extracted by the industry standard Aumund KZB pan conveyors.



At the berth a B&W “Kleen-Line” reversing shuttle conveyor discharges to the B&W mobile *Shiploader* as illustrated below.

In this manner the *Shiploader* may be travelled off the berth when not required for clinker export freeing the area for other port activities.

Going back to the first project discussed in this article where *Link Conveyors* are employed to transfer the 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 are illustrated in figure 19) including in this case full multidirectional 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.

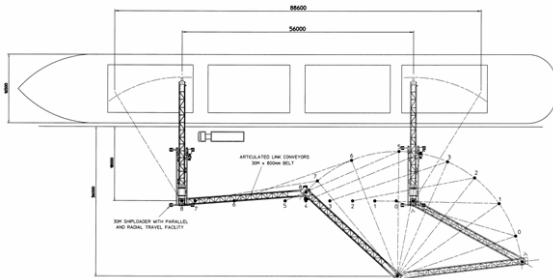


Figure 20

The illustration above shows a typical twin link conveyor installation combined with a fully mobile *Shiploader* with sufficient travel range to load and trim the vessel.

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 the equipment 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.



Figure 21

Illustrated in figure 21) 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 3 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, as illustrated in figure 22), eliminating the need for any fixed plant or permanent civil works...



Figure 22

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.

Another Aumund Group Success Story.