Tremont House, Galveston, Texas, USA

Kuwait Portland Cement Company
Kuwait

Presented by Mr. Peter Goransson, Sales Manager & Advisor, Bulk Handling Division, MacGregor Bulk AB
We are known as **BMH**\textsubscript{MARINE}

Our new name is **MacGREGOR Bulk**
A decision was taken by Kuwait Portland Cement Company to create a modern, high capacity bulk cement import terminal to increase the annual intake capacity of the terminal.

Since the volumes were increasing, a higher degree of flexibility as well as higher unloading rates were required.

In other words,

- A new concept to handle bulk cement delivered by bulk ships was on the agenda.
In late 2002, BMH Marine was invited by Kuwait Portland Cement Company, to study the ongoing cement import operation aiming at presenting a proposal how to upgrade the materials handling equipment at the Shuwaikh terminal in Kuwait. This investigation resulted in a request for tenders from all major suppliers for a ship unloading system comprising:

- Ship unloader
- Conveying system
- Distribution to silos
- Complete electrical control and distribution system
- Transportation
- Supervision of erection
- Commissioning
- Training
Original terminal overview

- Ship Unloader
- Future dock expansion
- Trench for conveying pipe
- Pneumatic conveying pipe
- Storage silos

28 November, 2006
BT/Peter Göransson
On site observations

Pneumatic Ship Unloader connected with heavy rubber hose.

Ship Unloader not moving during unloading due to hose connection.

Time consuming to move Ship Unloader from one position to another, 30 – 60 minutes.

Low unloading rate, only about 200 t/h in average.

Unloading operation requires much manpower.

Power consumption: 13,5 kWh/ton.
BMH Marine proposed the following system to upgrade and modernise the terminal:

- New rail bound Ship Unloader nominal capacity 800 t/h
- Movable transfer arrangement to quay belt conveyor
- Quay belt conveyor fully enclosed
- Transversal belt conveyor to silos fully enclosed
- Vertical screw conveyors to lift material to the silo top
- Aero slide distribution system on silo top
- New process control system based on PLC
- New motor control centre for new equipment
- Cement dust control system
New terminal layout

Siwertell Ship Unloader ST 490-F

Transfer tower

Quay belt conveyor 1

Transversal belt conveyor 2

Vertical screw conveyor

Aero slide distribution system
Siwertell Ship Unloader ST 490-F

- Ship unloader: model 490-F, no. 59
- Ship size 35,000 dwt or beam 28m
- Capacity rated: 800 mt/h
- Capacity peak: 900 mt/h
- Required power: 360 kW
- Weight 250 mt, incl. c/w 83 mt
- Auxiliary hoist 10 mt capacity
- Max. wheel pressure: 25 mt/wheel
- Portable Radio control unit
- Additional features:
  - Siwertell Monitoring System
  - Direct loading of bulk trucks
Movable Transfer Trolley

**Purpose:**
Transfer the unloaded product from Ship Unloader to shore conveying system without interfering with the operation of the Ship Unloader.

**Advantage:**
Gives an environmentally safe transfer of the product to the receiving system.
Increases the efficiency of operations
Belt conveying system ship to silo

Belt conveyor data:
- Total length: 171 m
- Belt width: 1400 mm
- Power installed: 37 kW

Belt conveyor particular features:
- Fully enclosed open top design with cover belt
- No conveyor gallery needed
- Easily accessible through removable side panels
Vertical screw conveyor VSC

Nordströms Vertical Screw Conveyors type VSC

Delivered since the 1950s
Compact design
Requires little space
Completely enclosed
Spillage free
High capacities 100 – 1500 t/h
Requires little maintenance

Dimensions (mm)

<table>
<thead>
<tr>
<th>Type</th>
<th>B1 (mm)</th>
<th>B2 (mm)</th>
<th>B3 (mm)</th>
<th>C</th>
<th>øD</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>K</th>
<th>L</th>
</tr>
</thead>
<tbody>
<tr>
<td>VSC 700</td>
<td>1600</td>
<td>4800</td>
<td>3850</td>
<td>1900</td>
<td>711</td>
<td>925</td>
<td>1600</td>
<td>1800</td>
<td>1100</td>
<td>325</td>
</tr>
<tr>
<td>VSC 600</td>
<td>1600</td>
<td>4800</td>
<td>3850</td>
<td>1800</td>
<td>610</td>
<td>825</td>
<td>1500</td>
<td>1600</td>
<td>900</td>
<td>325</td>
</tr>
<tr>
<td>VSC 500</td>
<td>1350</td>
<td>4800</td>
<td>3850</td>
<td>1600</td>
<td>506</td>
<td>700</td>
<td>1400</td>
<td>1600</td>
<td>800</td>
<td>325</td>
</tr>
<tr>
<td>VSC 400</td>
<td>1100</td>
<td>4200</td>
<td>3550</td>
<td>1400</td>
<td>406</td>
<td>600</td>
<td>1300</td>
<td>1250</td>
<td>650</td>
<td>300</td>
</tr>
<tr>
<td>VSC 300</td>
<td>900</td>
<td>3500</td>
<td>2900</td>
<td>1100</td>
<td>324</td>
<td>470</td>
<td>1000</td>
<td>975</td>
<td>500</td>
<td>275</td>
</tr>
<tr>
<td>VSC 200</td>
<td>650</td>
<td>3000</td>
<td>2700</td>
<td>800</td>
<td>219</td>
<td>370</td>
<td>800</td>
<td>800</td>
<td>400</td>
<td>235</td>
</tr>
</tbody>
</table>

We reserve the right to make changes.

Capacities (m³/h)

- VSC 700
- VSC 600
- VSC 500
- VSC 400
- VSC 300
- VSC 200

Capabilities in m³/h based on vertical conveying of cement.
Vertical screw conveyor VSC

Screw conveyor data:
Total lifting height: 61 m
Conveyor size: VSC 600
Installed power 2x200 kW per unit

Screw conveyor particular features:
Fully automatic lubrication system
Drive unit dimensioned to restart a fully loaded conveyor
Aero slide conveyors

Aero slide conveyor data:
Conveyor size: AS 630
Declination: 7°
Installed power 30 kW

Aero slide conveyor particular features:
Remote operated distribution valves
Process system configuration

Office

Central Control Room

Remote Access Modem
Hard Copy Printer
Alarm printer

Ethernet

Converter Ethernet/482

PLC

I/O communication
Totalizer
Belt Scale

Telephone

Connection box

New Ship Unloader

Alarm printer

Cable reel

PLC

Telephone

482
- The SIMON system is computer (PC) based with “no limits”
- Separate screens
- Better graphics and resolutions
- Better way to store historical data
- Provides help for quicker fault tracing
- Functions, such as manuals and service reports
- Storing mechanical and electrical drawings
SIMON typical menus

- Manual
- Data sheets
- Object status
- Drawings
- Main view
- Positions
The actual performance is within ± 10% of the set value.

This means the peak capacity is only 10% above the rated capacity.
During the delivery/installation period of 12 months for the new terminal system, a Siwertell 10 000 S Ship Unloader was ordered and delivered to site within 3 months.

The Siwertell 10 000 S with a dual truck loading system can operate in ships up to 15 000 dwt with an hourly unloading rate of 300 t/h.
Siwertell Ship Unloader 10 000 S in full action loading to two trucks
Handing statistics

• The modernised cement terminal became operational in June 2005

• Cargo handled is Portland Cement

• Up to the month of October 2006, 80 ships of various sizes have been unloaded

• Total amount of cargo unloaded is approx. 1,818,000 ton
Operation and maintenance

OPERATION

• Normal operation is based on a continuous operation. For such operation 4 operators are required.

MAINTENANCE AND SERVICE

• The maintenance and service team is manned and organized as follows:
  One  (1) Foreman
  One  (1) Electrician
  Two  (2) Mechanics
### Maintenance and service history

<table>
<thead>
<tr>
<th>Maintenance</th>
<th>Service</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preventive maintenance is of visual nature and a continuous process.</td>
<td>Service history is very short. So far, this activity is limited to replacing wear parts only</td>
</tr>
<tr>
<td>Periodical maintenance should be carried out at following intervals:</td>
<td>Parts repaired or replaced can be summarized as follows:</td>
</tr>
<tr>
<td>• Every month or 100 operating hours</td>
<td>• A drive shaft for the gantry conveyor</td>
</tr>
<tr>
<td>• Every 200 operating hours</td>
<td>• Minor components in the electrical system</td>
</tr>
<tr>
<td>• Every 6 months</td>
<td></td>
</tr>
<tr>
<td>• Every year or 500 operating hours</td>
<td></td>
</tr>
</tbody>
</table>

A recommended set of spare parts comprising strategically and wear parts to a value of US$ 100,000.- was included in the delivery. A majority of these spare parts are as of today still not consumed.
## Power consumption

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Installed power (kW)</th>
<th>Required power* (kW)</th>
<th>Power consumption* (kWh)/ton</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ship unloader</td>
<td>519</td>
<td>360</td>
<td>0,45</td>
</tr>
<tr>
<td>Shore conveyor</td>
<td>863</td>
<td>635</td>
<td>0,79</td>
</tr>
<tr>
<td>Distribution system</td>
<td>30</td>
<td>30</td>
<td>0,04</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1412</strong></td>
<td><strong>1025</strong></td>
<td><strong>1,28</strong></td>
</tr>
</tbody>
</table>

* valid at rated capacity
**Achievements**

**Objective:** Create a modern, high capacity bulk cement import terminal

**Achievements:**
- **High capacity:** Free digging capacity: max. 992 t/h
  - TTS capacity: average 440 t/h

**Energy consumption:** 1.28 kWh per unloaded ton

**Conclusion:** With a rail going Siwertell Ship Unloader combined with a Movable Transfer Trolley and a combination of different shore conveying system it is possible to create a high capacity terminal with low energy and maintenance cost at an affordable price
MacGREGOR offices in Sweden and abroad

Bjuv, Sweden (Head office): Ship unloaders & loaders, mobile unloaders, and complete marine terminals.

BMH Marine AB
Gunnarstorp
Box 566
SE-267 25 BJUV,
Sweden

Tel: +46 42 85800
Fax:+46 42 85899

E-mail: info@bmhmarine.se
USA representative: Mr Sture Lindgren
P.O. Box 211632
2529 Fox Glenn Circle
76021 BEDFORD, TX

E-mail sture.lindgren@attglobal.net
Phone (817) 354 8108, 214-649 8591

Enköping, Sweden (Branch office): Selfunloaders and conveying systems, mechanical and pneumatic.

BMH Marine AB
Gesällgatan 7
Box 914
SE-745 25 ENKÖPING
Sweden
Tel: +46 171 23200
Fax:+46 171 23299

E-mail: info@bmhmarine.se
Superior Performance by Swedish Technology