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Sir Francis Drake Hotel
San Francisco, Ca., USA

IN CO-OPERATION WITH CEMENT DISTRIBUTION CONSULTANTS



OPERATIONAL EXPERIENCES WITH A MECHANICAL SHIPUNLOADER AT CALAVERAS STOCKTON TERMINAL

Peter Göransson
General Manager
BMH Marine AB.
Sweden

Biography



Peter Göransson
General Sales Manager
BMH Marine AB

SWEDEN

Education:

Mechanical Engineering, Tycho Brahe skolan, Helsingborg, 1977
Economics and Marketing , KomVux, Helsingborg, 1982

Professional experience:

1979 – 1986

Various employments within the Swedish car industry.

1986-1990

BMH Marine AB, Bjuv, Sweden.
After sales & Service Department
Sales Engineer

1990-1998

BMH Marine AB, Bjuv, Sweden.
Marine Terminals Cement
Project Manager

1998-2001

BMH Marine AB, Bjuv, Sweden.
Marine Terminals Cement
Regional Sales Manager

2001-

BMH Marine AB, Bjuv, Sweden.
Bulk Terminals, Cement
General Manager

Follow up study of cement terminal project for Calaveras Cement Company, CA, USA



Presented by: Peter Goransson, BM H
Marine AB

Background

A decision was taken by Calaveras Cement Company to create a modern, high capacity bulk cement import terminal to replace the existing selfunloading ships supplying cement to the terminal.

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

In other words,

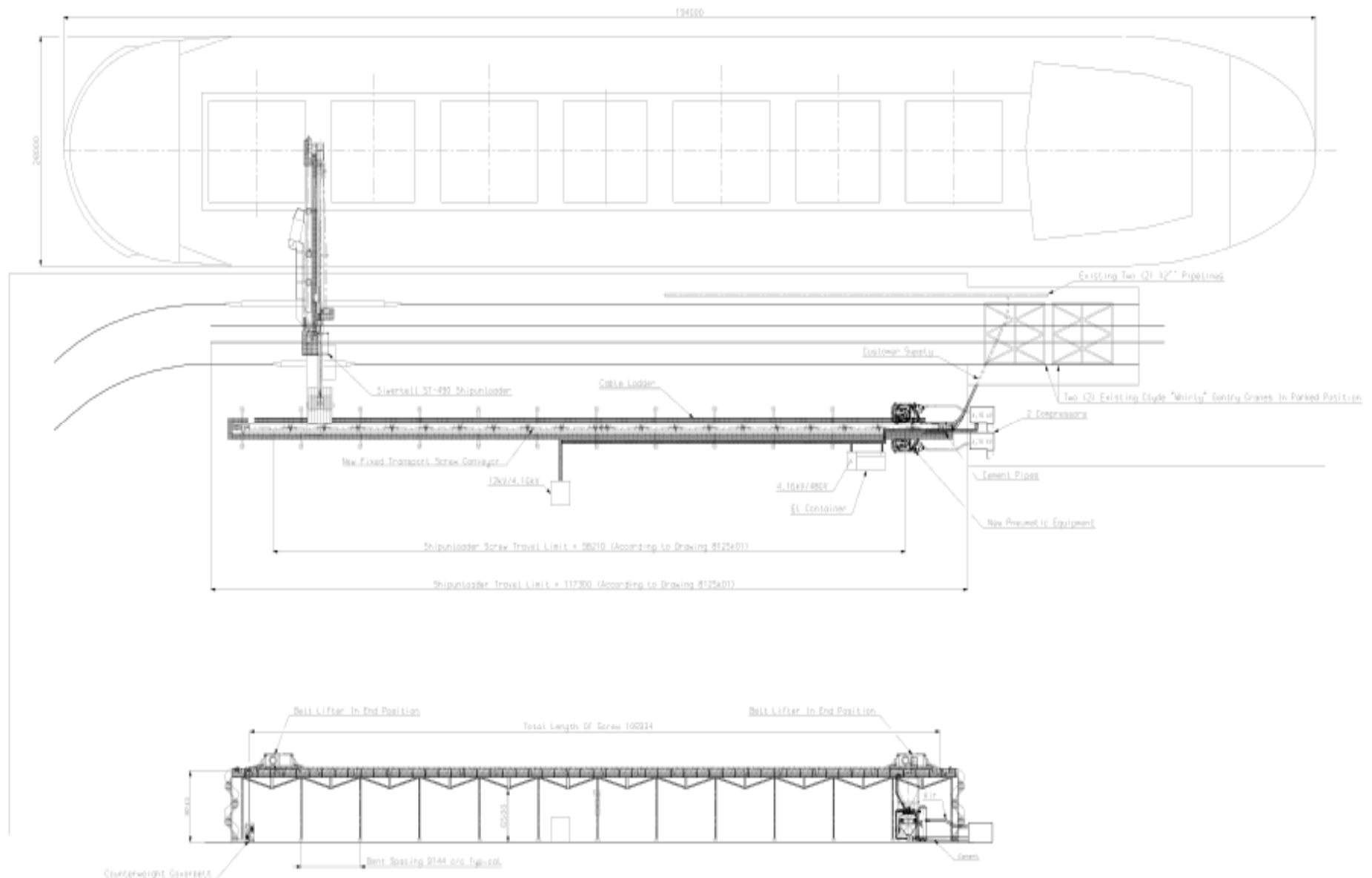
- *A new concept to handle bulk cement delivered by bulk ships was on the agenda.*



A pre-study was made by River Consulting in 1998 that later 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



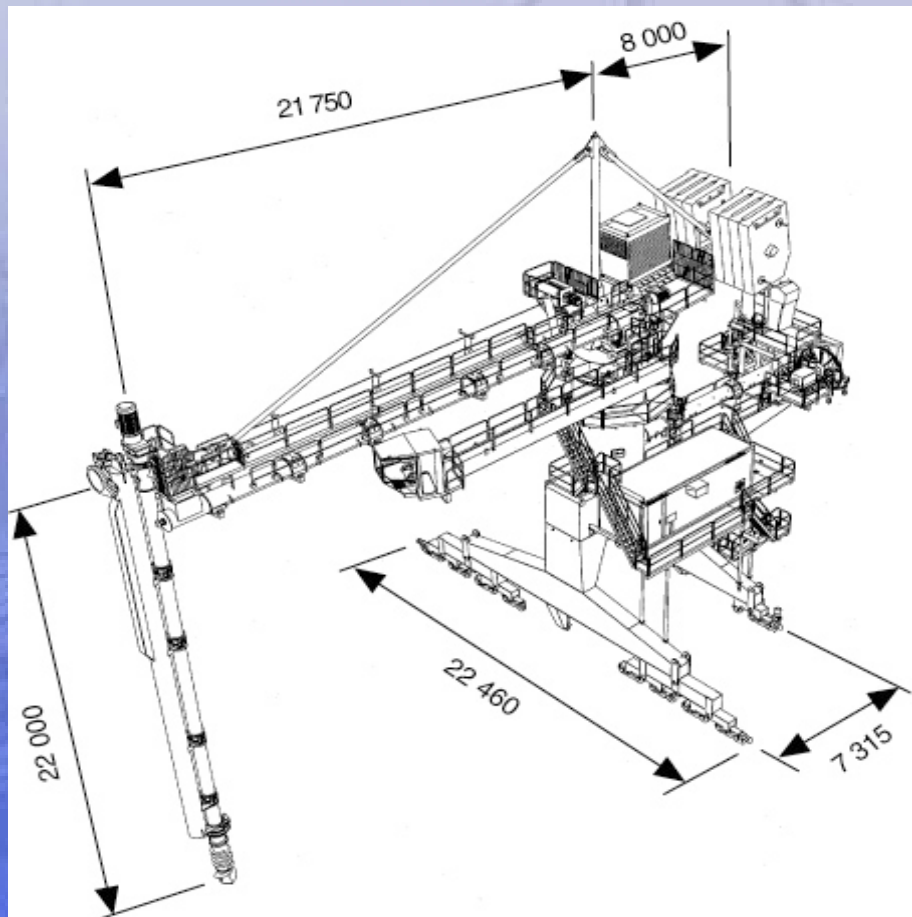
In May 1999, the main equipment was ordered from BMH Marine due to the following reasons:



- The well proven capacity of the Siwertell unloader and long relation with BMH Marine
- The combination of a jetty screw conveyor, that allows the unloader to travel along the ship during operation, and a fixed pneumatic conveying system utilizing the existing pipe system
- The ability to meet the tough maximum allowed wheel-load requirements. Jetty strengthening would be extremely costly



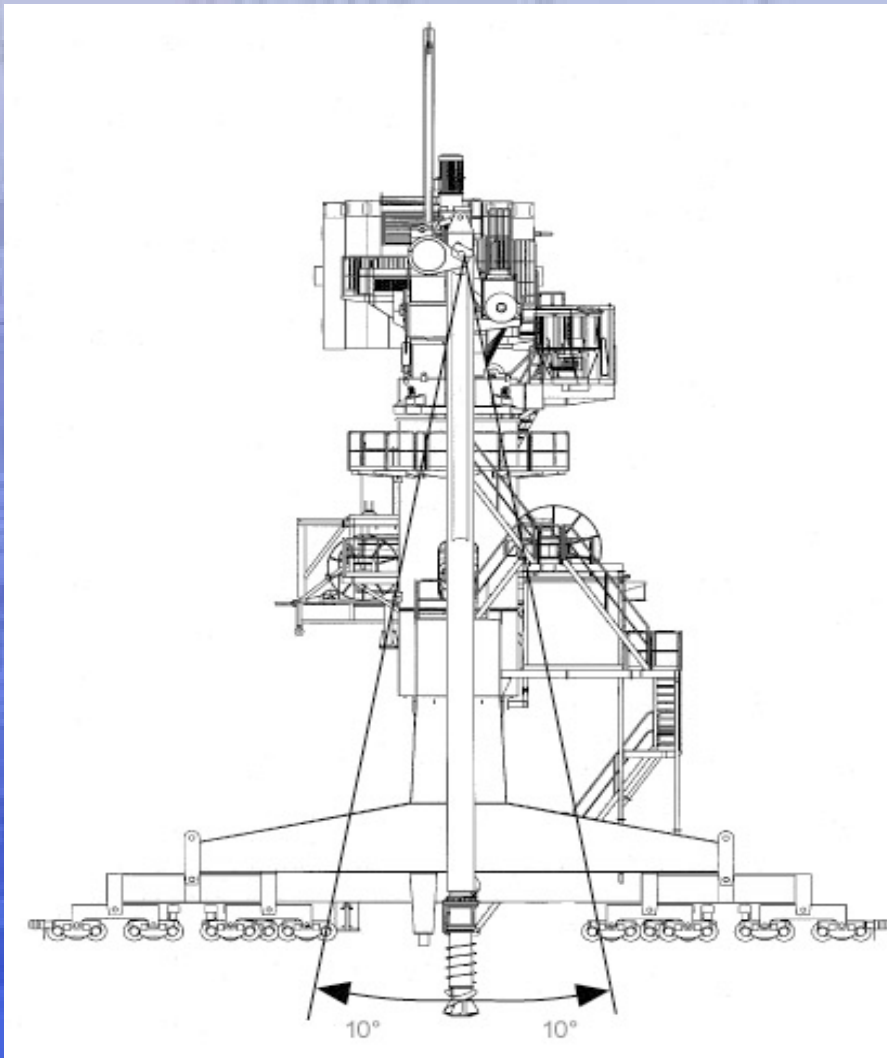
- The order was executed in close co-operation with HTC Technology Center in Pennsylvania
- Turn key delivery time, ready for operation within 46 weeks
- All equipment is designed in compliance with US and California norms and regulations



- Ship unloader: model 490-F
- Ship size 35,000 dwt or beam 28m
- Capacity rated: 700 mt/h
- Capacity peak: 750 mt/h
- Required power: 334 kW
- Weight 277 mt, incl. c/w 98 mt
- Auxiliary hoist 15 mt capacity
- Max. wheel pressure: 15 mt/wheel
- Radio control unit

Additional features:

Side tilting motion of vertical arm
Operator's cabin
Collector unit



- Side tilting is a vertical arm motion $\pm 10^\circ$ perpendicular to the horizontal arm
- Side tilting offers improved reach into corners and underneath hatch opening
- Side tilting minimizes clean up work as a larger area in the ship's hold can be reached



View from cabin



Cabin arm with cabin

- The ship unloader is equipped with an operator's cabin mounted on a separate cabin arm
- The operator's cabin has three sides and parts of the bottom covered with glass to give a good view into the cargo hold
- Equipped with air condition and heating for warm or cold days



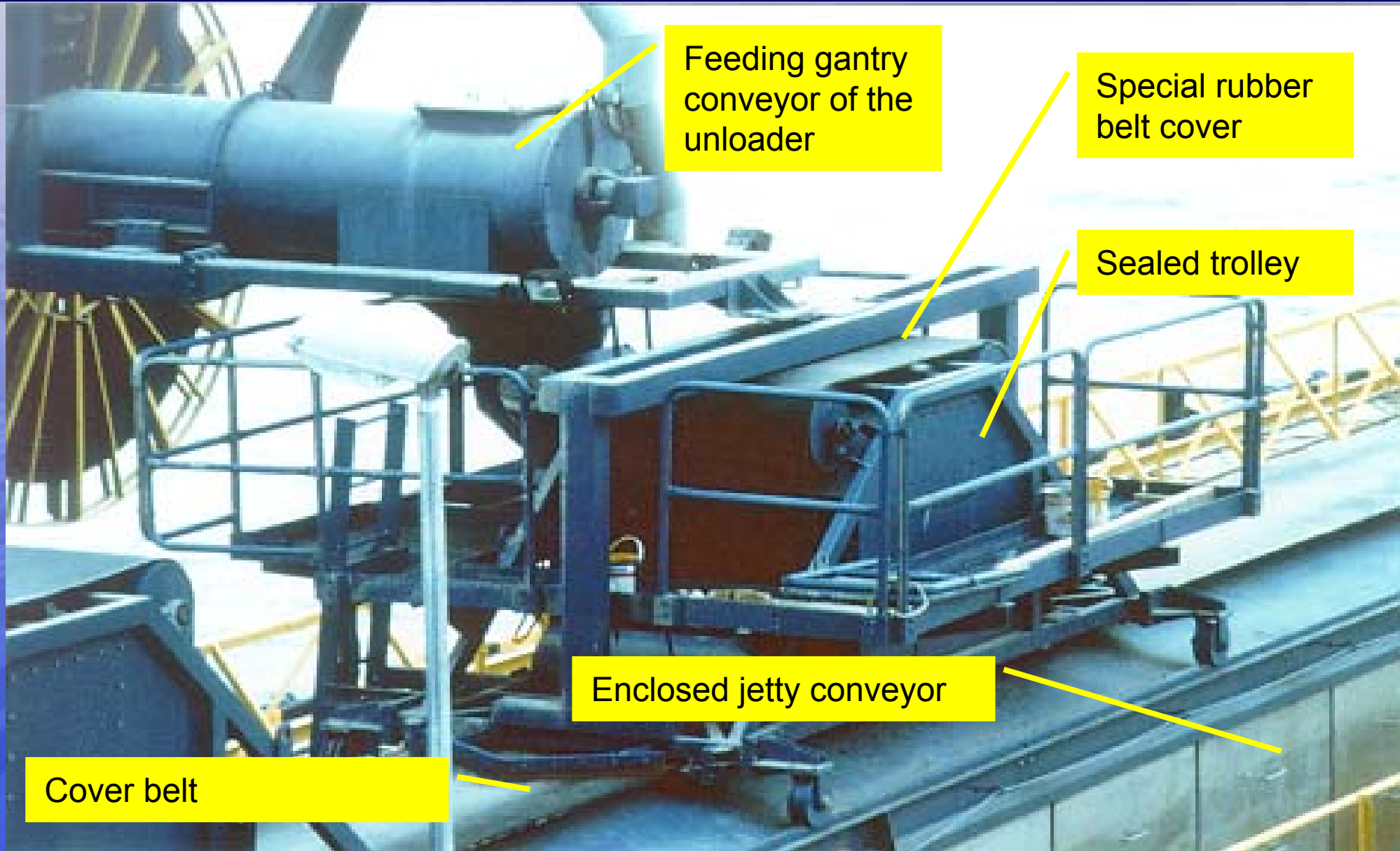
- Collector unit for clean-up work
- Separate unit, easy to connect
- Gives same or higher unloading capacity compared pay loaders operation
- Creates less emissions from the cargo hold
- Floats on the tank top independent of unloader arm or ship angles
- Efficient



- Capacity rated 700 mt/h
peak 750 mt/h
- Required power 75 kW
average
- Total weight 29,5 mt
- Open top Nordströms HNL 800
screw conveyor, length 107
meters, double drive units
- Centralised fully automatic
lubrication system
- BMH Movable Belt Trolley for
material transfer between the
ship unloader and screw
conveyor

BMH Movable Belt Trolley arrangement

BMH Marine



Pneumatic conveying system

BMH Marine



- **BMH Kettle-type pneumatic conveying system BP 9S**
- **Capacity 350 + 310 mt/h**
- **Conveying distance 150 to 200 meters depending on silo**
- **Required power 850 kW average**
- **Buffer hopper 50 tons**
- **Existing pipes 2 x 12" to be used**

Installation and Commissioning

BMH Marine



- All equipment was delivered turn-key by BMH Marine. The installation was made in several steps and took about 3 months in total to complete
- Training, commissioning and performance test (including verifying the guaranteed unloading rate) was fully completed and passed during the four days of unloading the first 35,000 dwt vessel

Owner's comments after 2 years of operation:

- Today, an entirely mechanical system would have been preferred due to power consumption/capacity relation and the fact that screw/belt conveyors are less sophisticated compared to a pneumatic system
- The ship unloader should have been designed for larger ships, today the ship size is limited to 35,000 dwt
- It took some time for the stevedoring operators to get used to the ship unloader that is more sophisticated than they were used to from other Siwertell units

- Normal operation is based on a 2 shift (2 x 8 hrs) system that gives totally 13,5 effective operating hours/day (24 hrs) At start there was also a night shift but this was found inefficient and is today terminated
- One typical working shift crew comprises
 - One (1) Foreman
 - Two (2) Siwertell operators
 - One (1) Shore system operator
 - One (1) Pay loader operator during clean-up
 - Two (2) Broomers during clean up



A CAT 938 with a 4 cu.yard bucket is used to assist the ship unloader to collect material in the corners

The Collector Unit is always used to minimize the need for pay-loader operation



- Terminal commenced operation on May 12, 2002
- Cargo handled is Standard Portland Cement
- Cement transfer time > 3 weeks = packed cement
- 17 ships of size 35,000 dwt have been unloaded
- Total amount of cargo handled approx. 500,000 ton

Design data (Guaranteed)	Verified data
<ul style="list-style-type: none">Rated capacity 660 mt/h (free digging)	Rated capacity 700–725 mt/h (free digging)
<ul style="list-style-type: none">Through the hold capacity 495 mt/h (75% of rated)	Through the hold capacity 495 mt/h
<ul style="list-style-type: none">Average through the ship capacity 450 mt/h (68% of rated)	

For maintenance and service of the terminal equipment an own crew is employed. The crew comprises

One (1) Foreman

Two (2) Mechanics

One member is specially trained to maintain the ship unloader

Electrical maintenance and service is outsourced to local companies

Total cost for maintenance and service is US\$ 0,15.- / ton

Maintenance

Preventive maintenance is of visual nature and a continuous process.

Periodical maintenance should be carried out at following intervals:

- Every month or 100 operating hours
- Every 200 operating hours
- Every 6 months
- Every year or 500 operating hours

Service

Service history is very short. So far, this activity is limited to replacing wear parts only

Parts replaced can be summarized as follows:

- Butterfly valves in the pneumatic system. A revision of the control program rectified this problem
- Minor components in the electrical system

A recommended set of spare parts comprising strategical and wear parts to a value of US\$ 60,000.- were included in the delivery. A majority of these spare parts are as of today still not consumed.

Equipment	Installed power (kW)	Required power* (kW)	Power consumption* (kWh)/ton
Ship unloader	555	334	0,48
Shore conveyor	2 x 110	75	0,11
Pneumatic system	2 x 500	850	1,29
Total	1775	1259	1,88

*Required power and power consumption are valid at rated capacity

Objective:

Create a modern, high capacity bulk cement import terminal

Achievements:

- High capacity: Free digging capacity 700-725 mt/h
TTH capacity 495 mt/h (75% of rated)
TTS capacity 450 mt/h (68% of rated)
- Energy consumption: 1,88 kWh / unloaded ton
- Maintenance and Service cost: US\$ 0,15.- / unloaded ton

Conclusion:

With a rail going Siwertell unloader combined with a shore screw conveyor and a pneumatic Kettle system it is possible to create a high capacity terminal with low energy and maintenance costs.

The end!
Thank you for your attention.