



*Nordströms  
Siwertell*

Tremont House, Galveston, Texas, USA

## HIGH CAPACITY SHIP UNLOADING



Presented by: Mr. Peter Goransson, Sales Manager & Advisor,  
Bulk Handling Division, MacGREGOR Bulk AB, December 2006

**MacGREGOR**

# Name change

*Nordströms  
Siwertell*

We are known as

**BMH** Marine

Our new name is

**MacGREGOR Bulk**

# About this presentation

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How to minimize the time the ship is at your berth is the key factor to focus on!

The right way to approach this is to increase the efficiency and the unloading rate of the ship unloading system.

We will show an example of how it can be done!!



# Definition of high capacity

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Each supplier have their own definition of high capacity, some even claim 300 mt/h to be high capacity!!

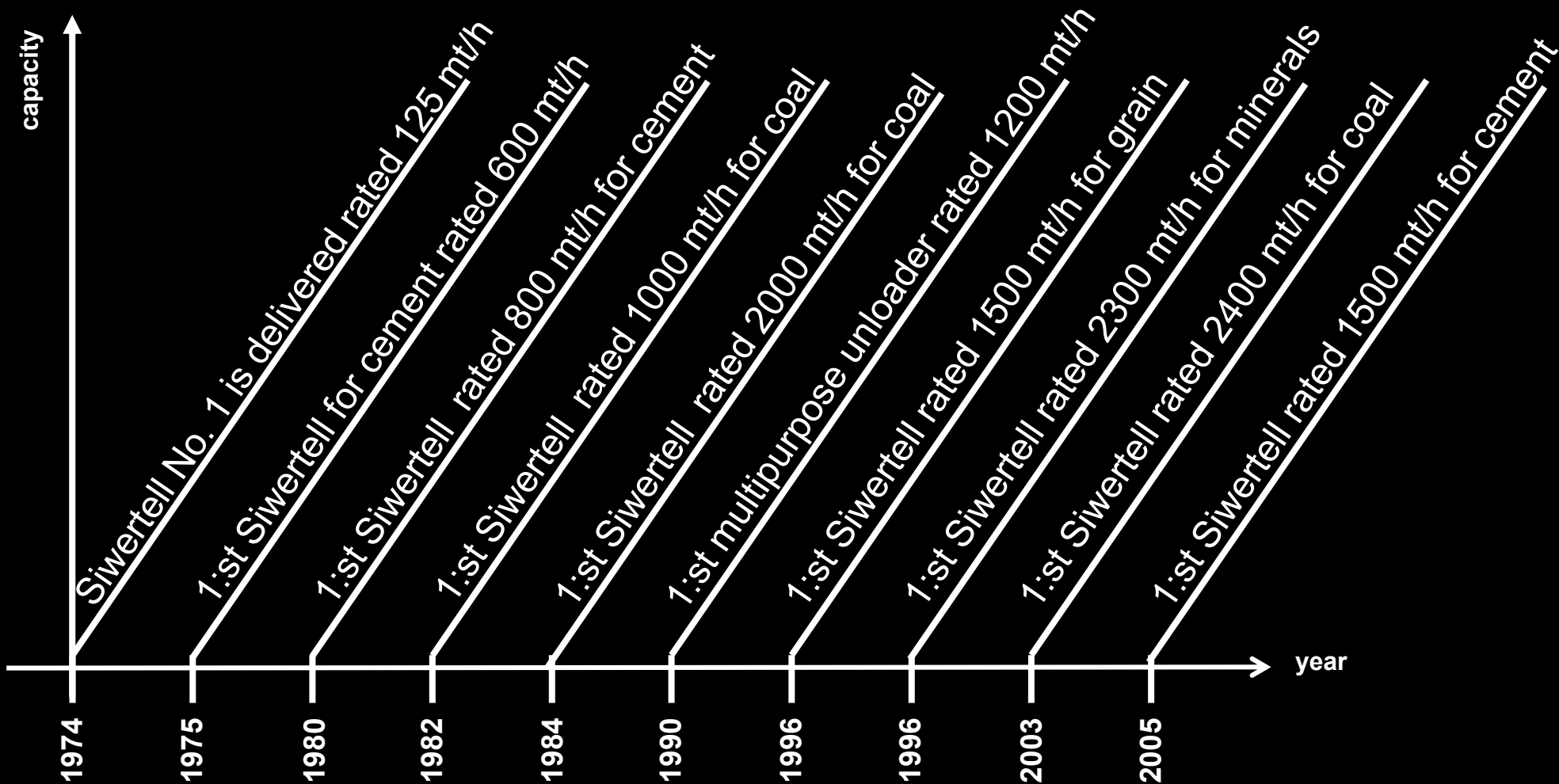
MacGREGOR Bulk's definition of high capacity is as follows:

A rated unloading capacity of minimum 1500 mt/h with a maintained efficiency of minimum 70% of the rated capacity.

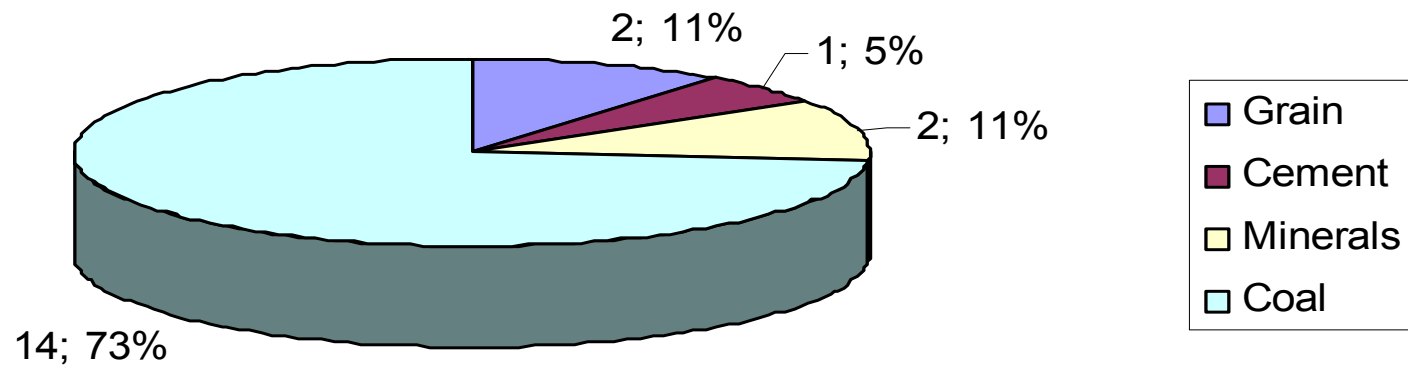
$$\text{Efficiency} = \frac{\text{Through-the-ship capacity}}{\text{Rated capacity}}$$

# Unloading rate development

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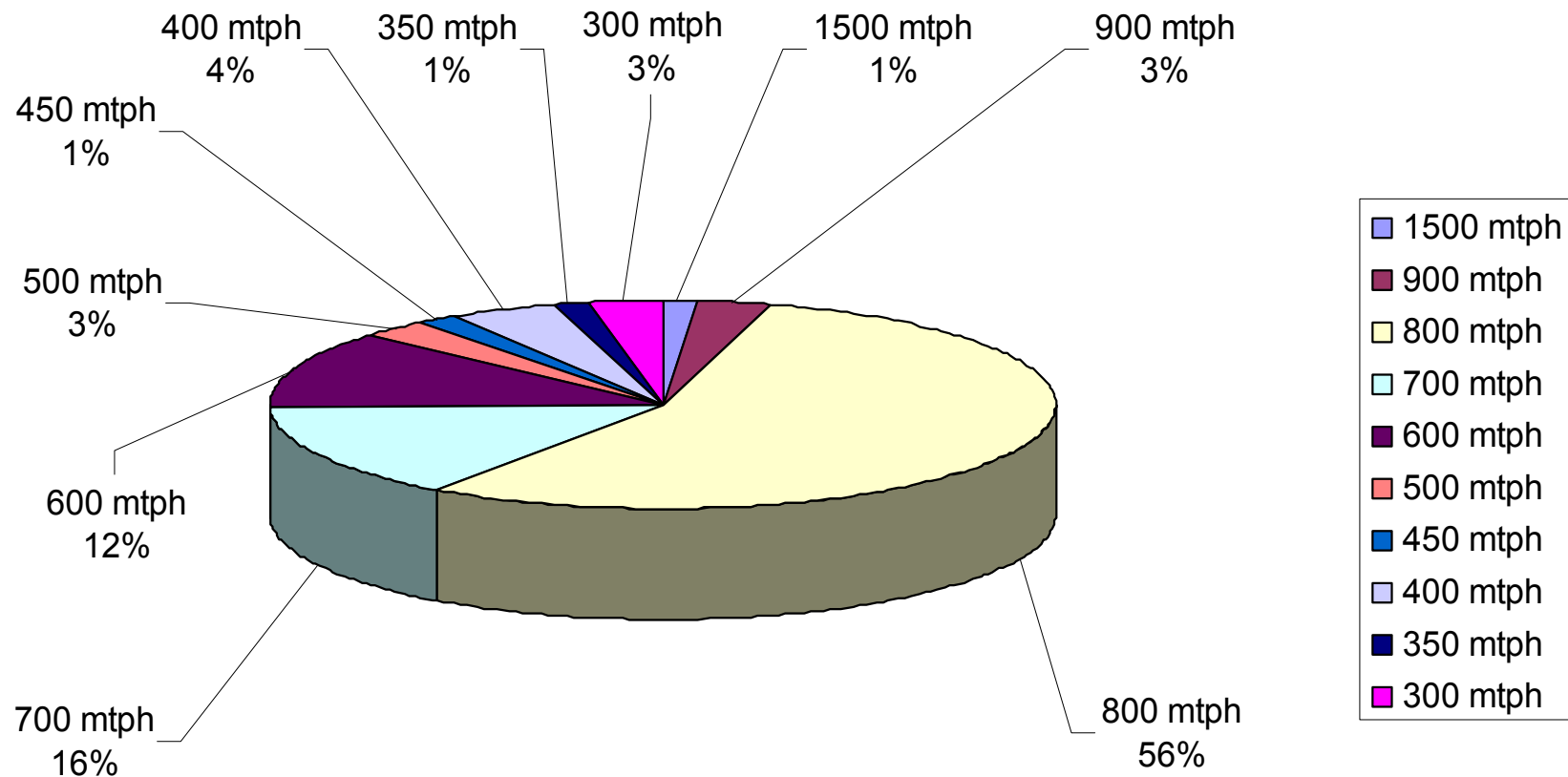
## Siwertell ship unloaders with a rated unloading capacity exceeding 1500 mt/h



**Totally 19 ship unloaders delivered**

# Design rate statistics cement

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**Mobile unloaders excluded**

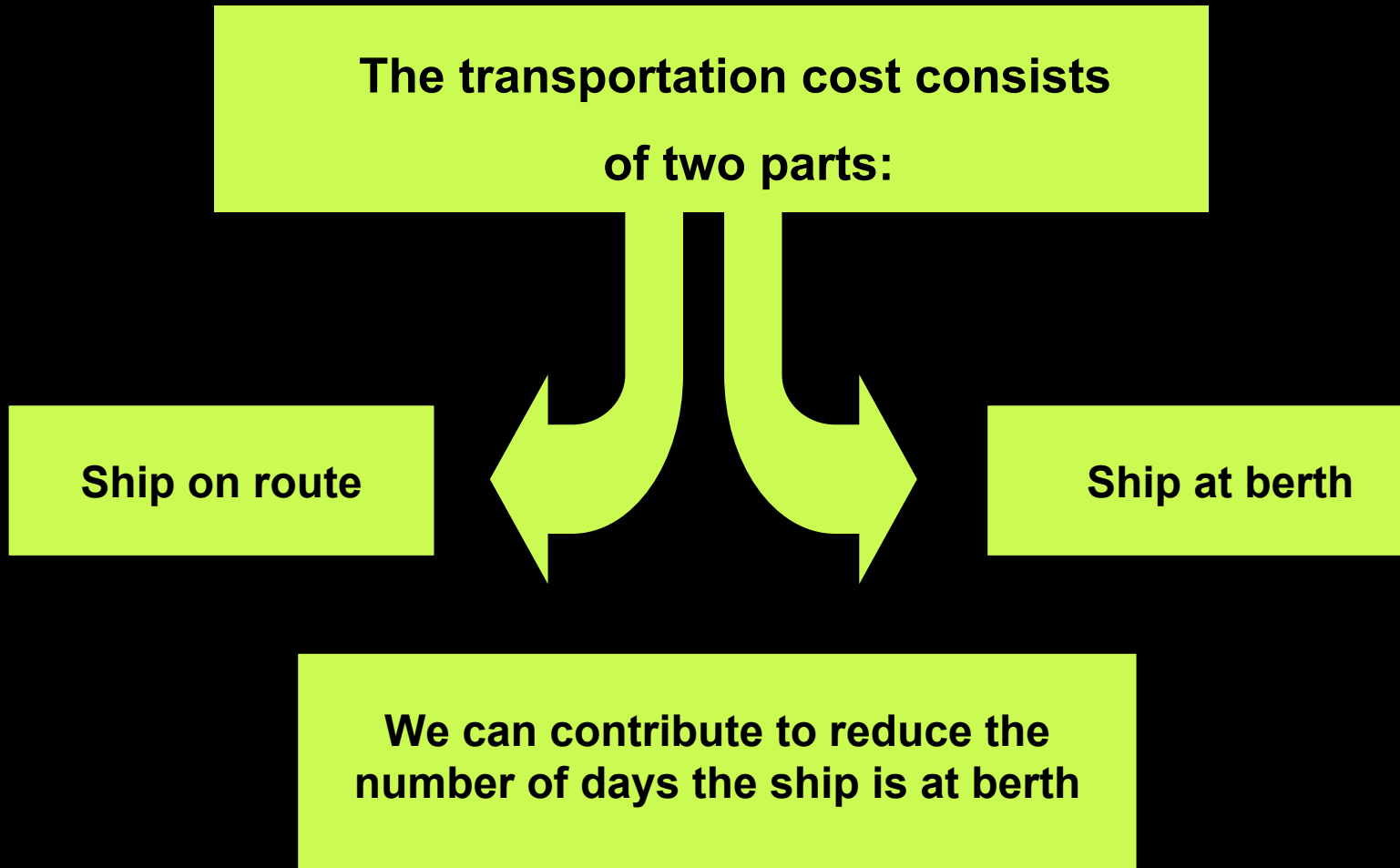


# Which factors have an impact on the total unloading cost?

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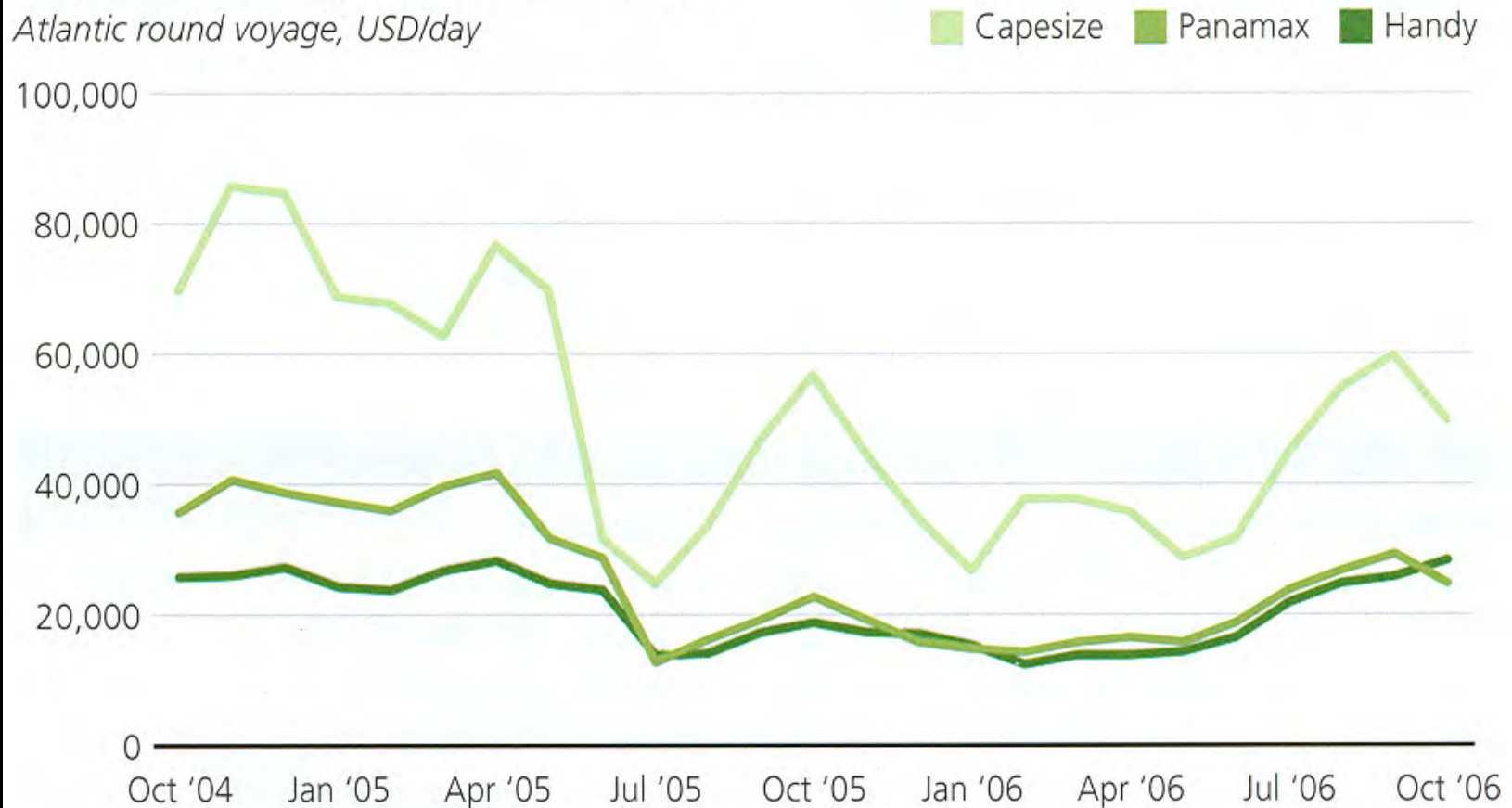
1. Freight cost (daily cost of ship)
2. Efficiency of the ship unloading system
3. The capacity of the ship unloading system
4. The energy consumption of the ship unloading system
5. The expected annual throughput of the terminal
6. The ship size





## Dry bulk freight development

Atlantic round voyage, USD/day



Source: Fearnleys/SSG, October 20, 2006

**When the factors previously mentioned have been made up, these numbers can then be entered into this spread sheet.**



# Cost summary

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Annual throughput 1 million ton

Input data	Unit	Siwertell 800 t/h	Siwertell 1500 t/h
Annual throughput	tons/year	1,000,000	1,000,000
Ship size	dwt	60,000	60,000
Rated unloading capacity	tons/hour	800	1500
Through-ship-capacity	tons/hour	560	1050
Ship cost per day	US\$	20,000	20,000
Number of unloading days	days	89*	48*
Total ship cost at quay	US\$	3,181,377.-	2,080,854.-
Annual cost saving	US\$		1,100,523

\* Based on 20 hours of operation

# Cost summary

*Nordströms  
Siwertell*

Annual throughput 1 million ton

Input data	Unit	Siwertell 800 t/h	Siwertell 1500 t/h
Annual throughput	tons/year	1,000,000	1,000,000
Ship size	dwt	60,000	60,000
Rated unloading capacity	tons/hour	800	1500
Through-ship-capacity	tons/hour	560	1050
Ship cost per day	US\$	30,000	30,000
Number of unloading days	days	89*	48*
Total ship cost at quay	US\$	4,070,324.-	2,557,044.-
Annual cost saving	US\$		1,517,190

\* Based on 20 hours of operation

# Cost summary

*Nordströms  
Siwertell*

Annual throughput 2 million ton

Input data	Unit	Siwertell 800 t/h	Siwertell 1500 t/h
Annual throughput	tons/year	2,000,000	2,000,000
Ship size	dwt	60,000	60,000
Rated unloading capacity	tons/hour	800	1500
Through-ship-capacity	tons/hour	560	1050
Ship cost per day	US\$	20,000	20,000
Number of unloading days	days	178*	96*
Total annual cost	US\$	5,727,806.-	3,458,949.-
Annual cost saving	US\$		2,268,857.-

\* Based on 20 hours of operation

# Cost summary

*Nordströms  
Siwertell*

Annual throughput 2 million ton

Input data	Unit	Siwertell 800 t/h	Siwertell 1500 t/h
Annual throughput	tons/year	2,000,000	2,000,000
Ship size	dwt	60,000	60,000
Rated unloading capacity	tons/hour	800	1500
Through-ship-capacity	tons/hour	560	1050
Ship cost per day	US\$	30,000	30,000
Number of unloading days	days	178*	96*
Total annual cost	US\$	7,513,520.-	4,411,320.-
Annual cost saving	US\$		3,102,190.-

\* Based on 20 hours of operation

How would my terminal benefit from  
a ship unloading capacity upgrade?





# From thinking to action!

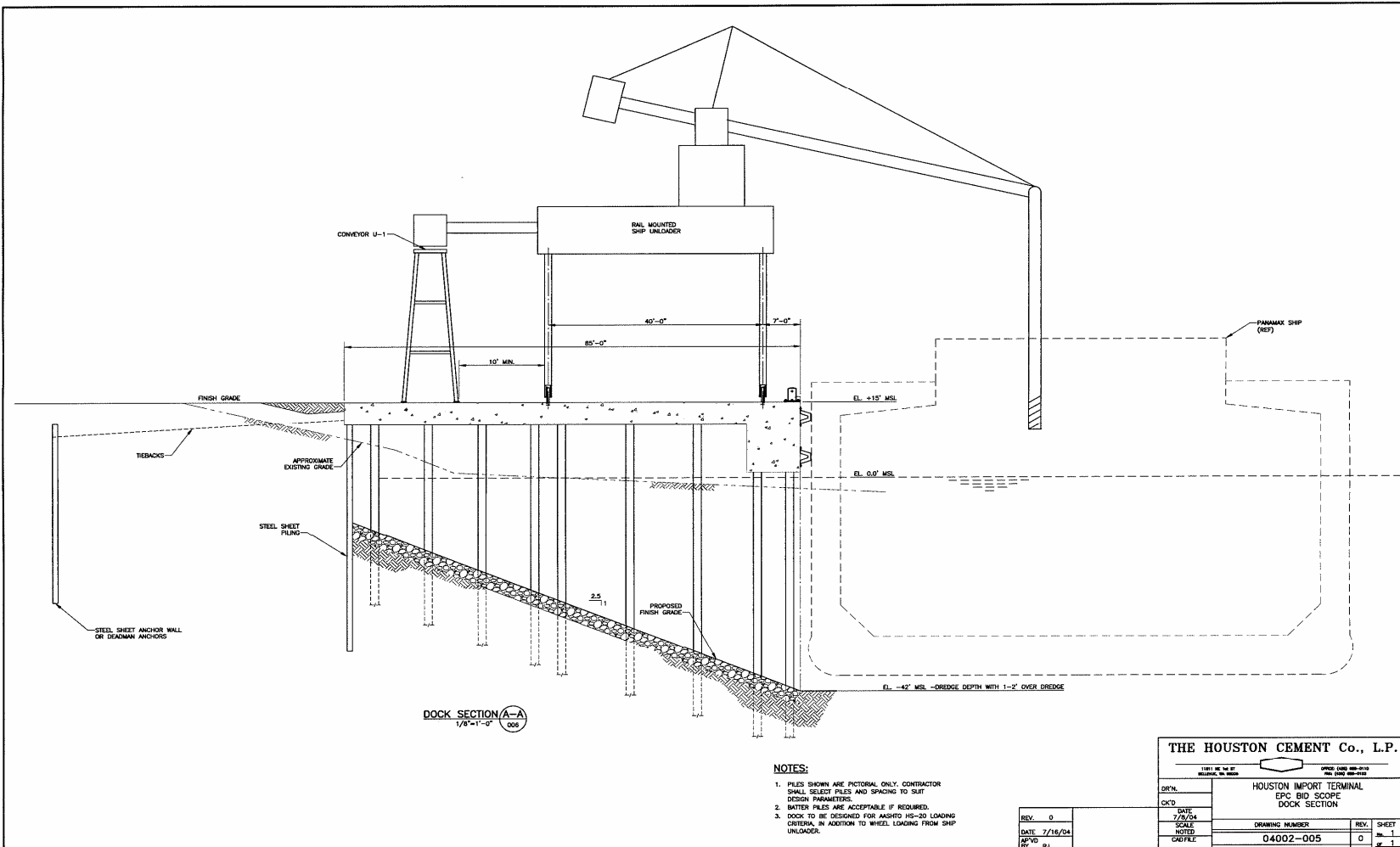
*Nordströms  
Siwertell*

## Houston Cement Company, Houston, Texas USA



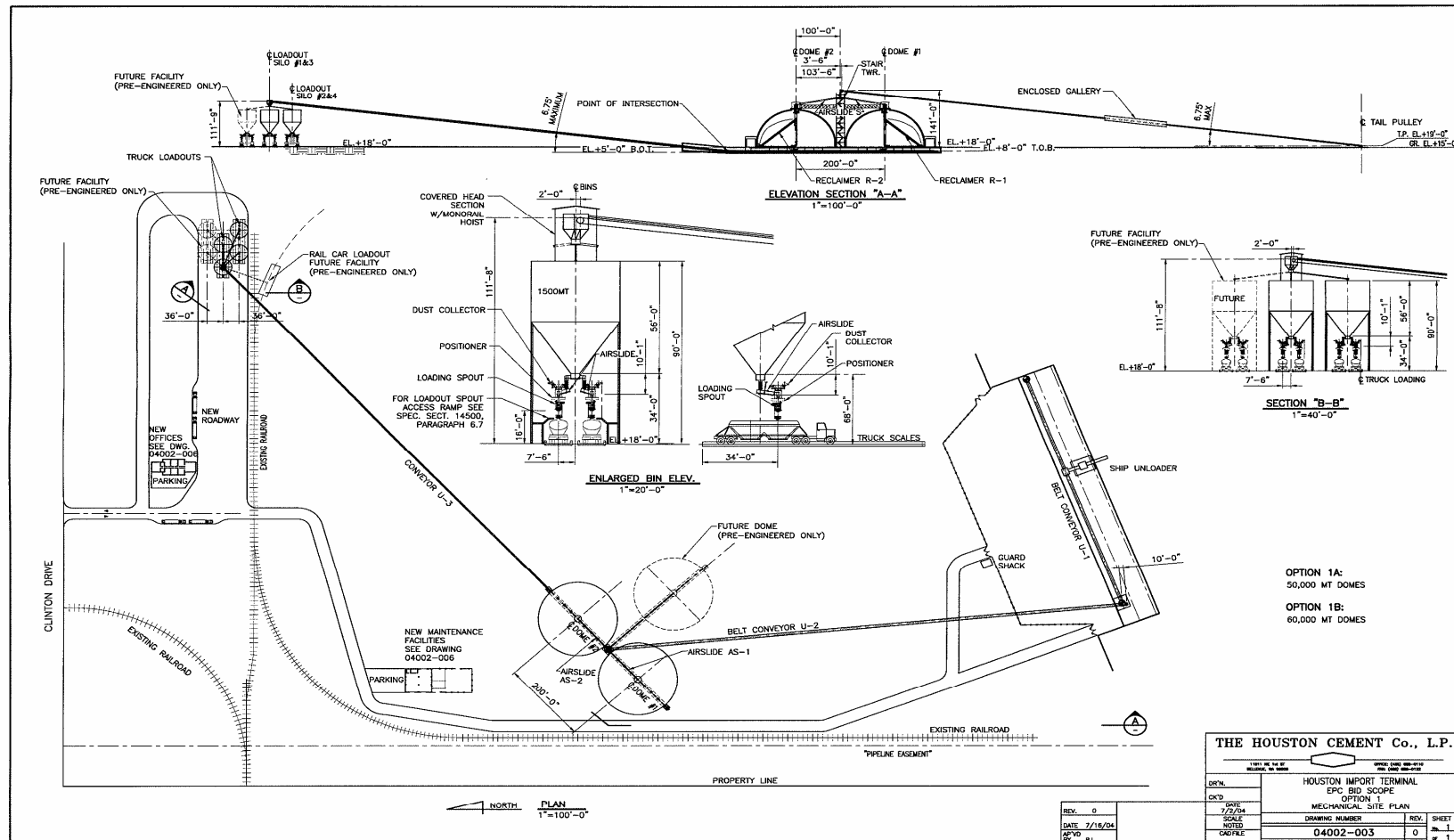
# Study of layouts (Ship unloader and dock)

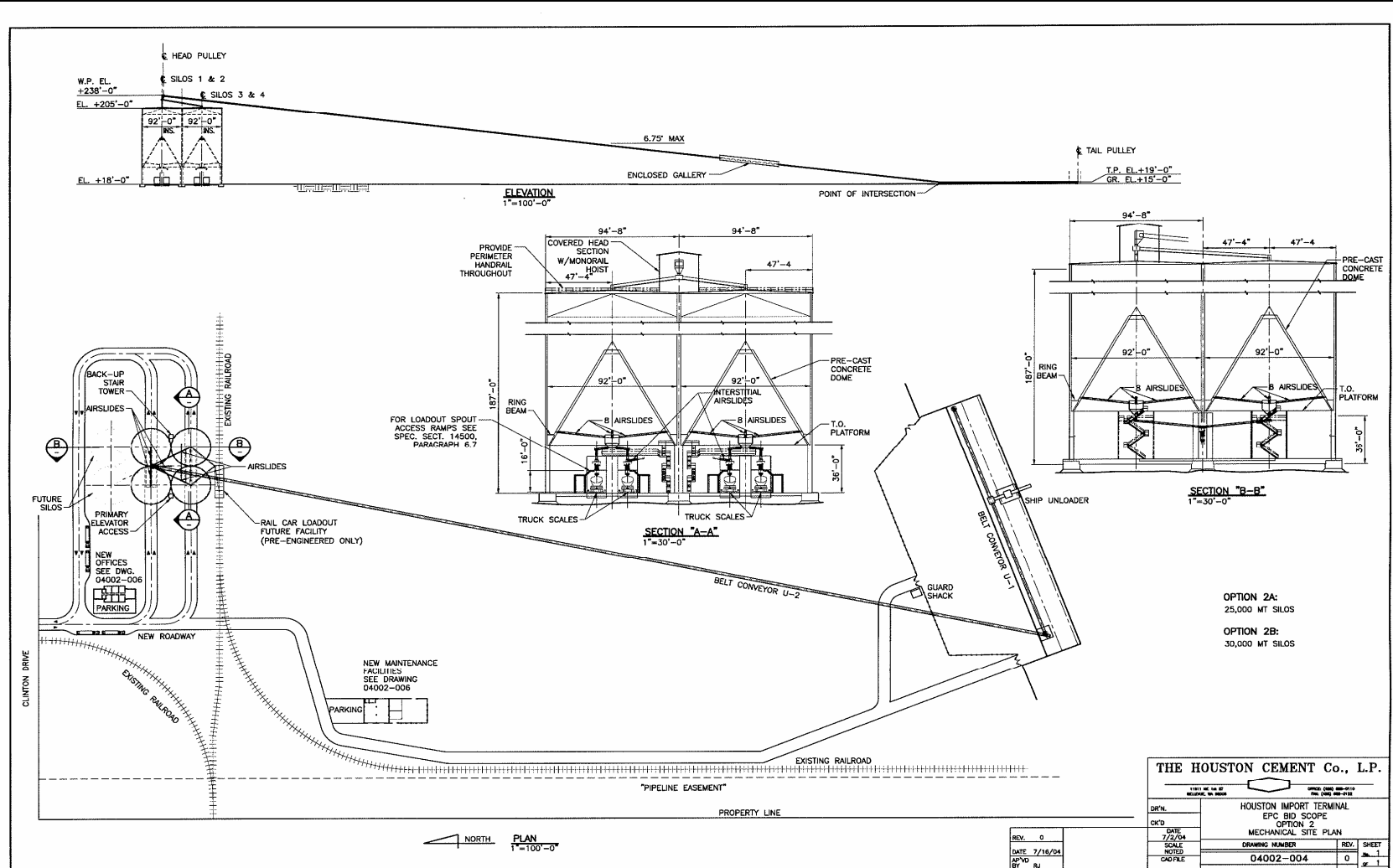
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# Study of terminal layout

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Siwertell**

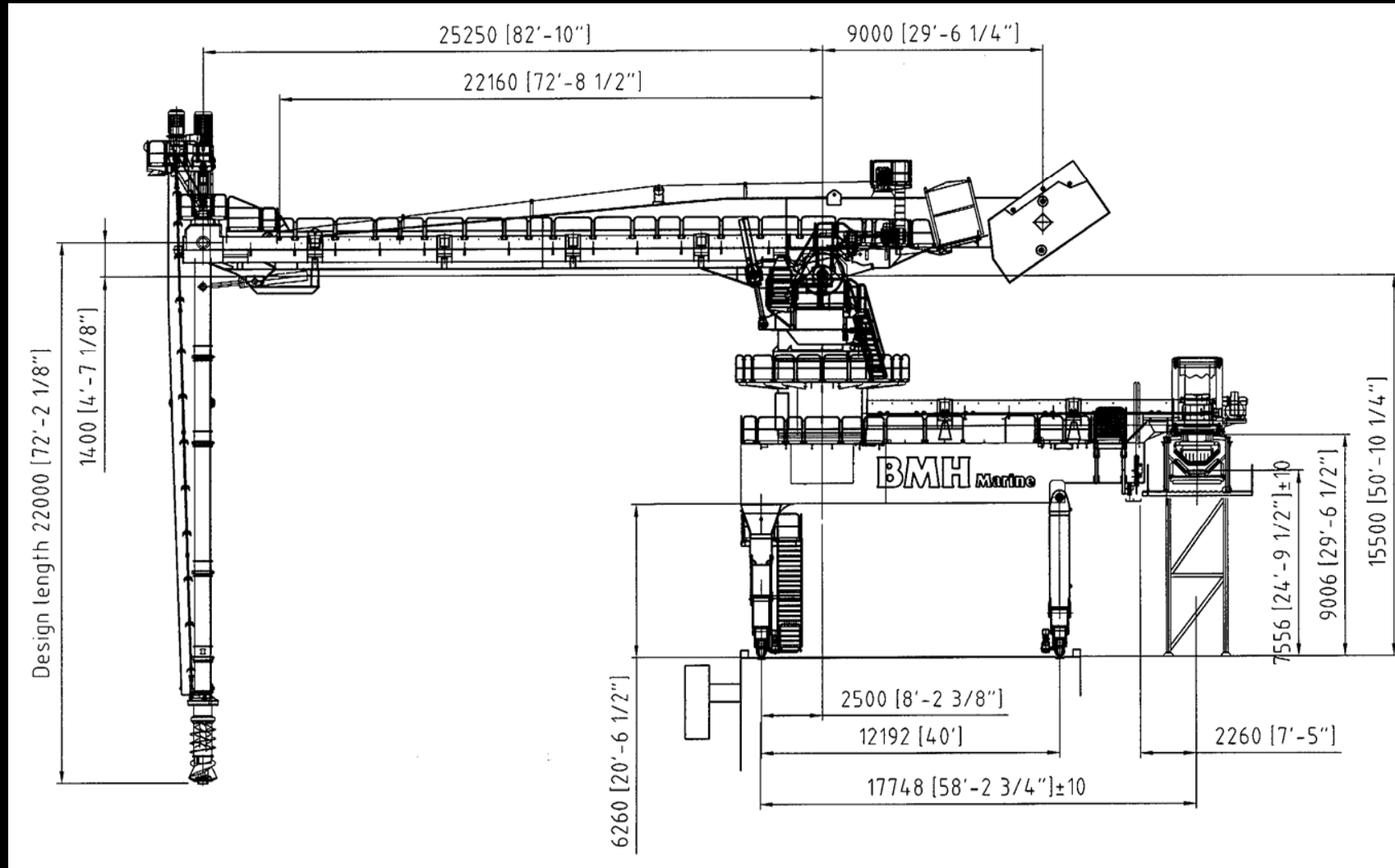


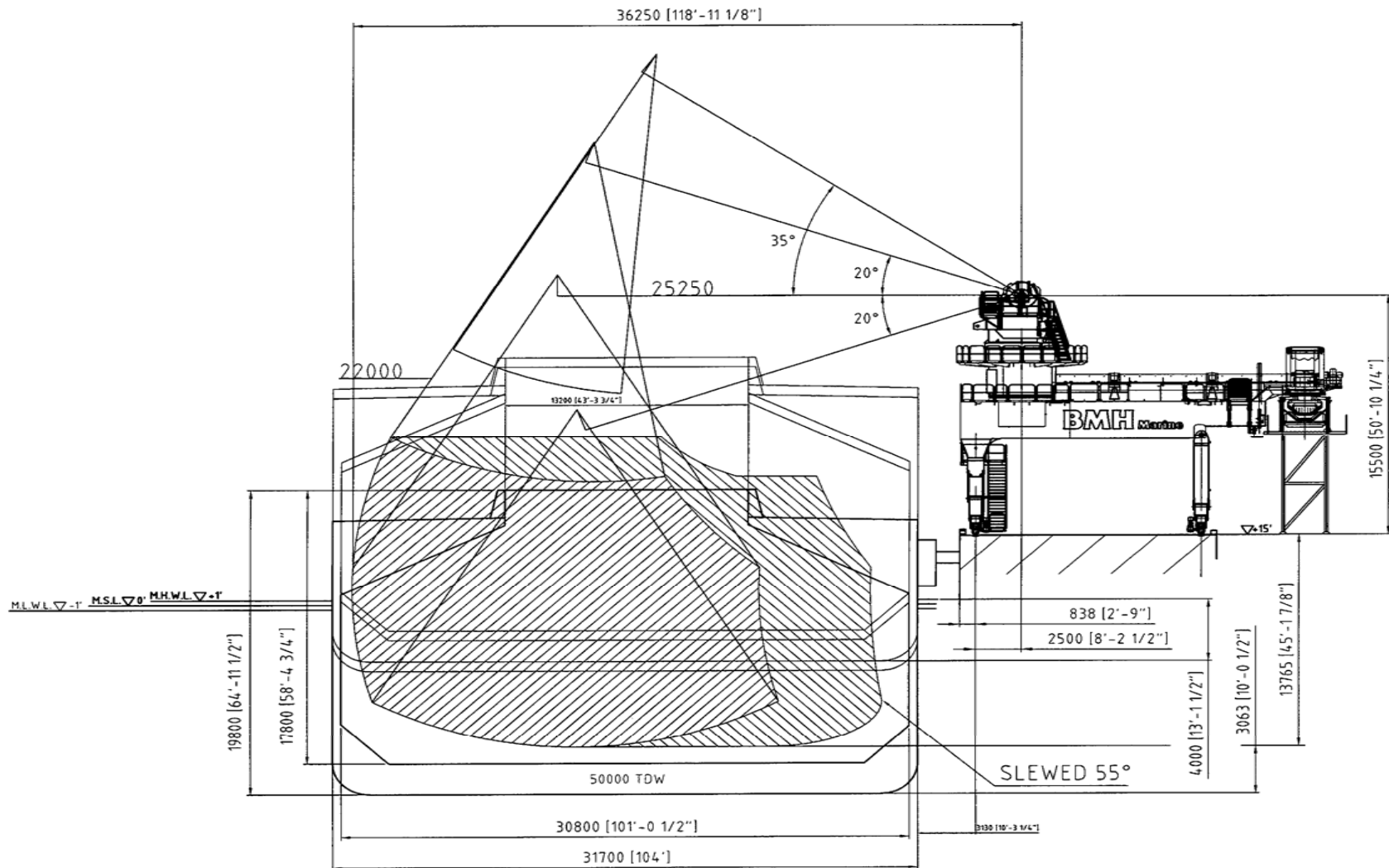




# Ship unloader main dimensions

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# Siwertell D-type ship unloader

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- The Siwertell D-type is the heavy-duty machine of continuous Siwertell screw-type ship unloaders
- The D-type unloads ships up to 180,000 dwt
- Can be used for all applications, no limitations
- Now also available for operation at large cement terminals when a high through-ship-capacity and annual intake is required



# Ship unloader facts

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**The largest continous cement ship unloader  
known in terms of size and capacity**



**Facts:**

**Model ST 640-D**

**Vertical arm: 22 m**

**Vertical conveyor: VST 640**

**Horizontal arm: 25,25 m**

**Horizontal conveyor: HST 1000**

**Total weight: 415 tons**

**Power consumption:  
0,40 kWh/ton**

**Installed power: 952 kW**

**At rated capacity: 600 kW**

**Rated capacity 1500 mt/h**



# Ship unloader facts

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Siwertell*



**View of horizontal arm and  
vertical conveyors**

**Horizontal conveyor size 1000 mm (40")**

**Vertical conveyor size 640 mm (25")**

**Twin motor drive unit for  
vertical conveyor**

# Terminal data

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**6 storage silos, total storage  
volume 100,000 m ton**

**Dock facilities with ship unloader  
and belt conveying system**





# Ship unloader and belt conveyor

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# Movable Transfer Trolley

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## Key feature



### 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





# Conveying system to silos

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# Belt conveyor facts

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Conveyor gallery with belt conveyor, open top type  
72" belt conveyor (1905 mm) is used





# Terminal data

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**Conveying to shore with  
belt conveyors**

**Vertical elevation by two  
bucket elevators  
each rated at 1000 t/h**

**Height of bucket elevators  
about 70 m**



**Distribution of material  
on the silo top by means  
of aero slides**



# Belt conveyor and transfer tower

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# Performance testing

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# Performance testing

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## Appendix 7

### PERFORMANCE TESTING DOCUMENT

#### PURCHASER

Name and address  
Houston Cement Company, L.P.  
363 N. Sam Houston Pkwy, Ste. 1100  
Houston, TX 77060  
USA

(hereinafter called Purchaser)

#### SUPPLIER

BMH Marine AB  
Box 566  
S-267 25 BJUV  
Sweden

(hereinafter called Supplier)

End-user: (if other than Purchaser)

Agreement: According to Contract between Supplier and Purchaser, dated xxxx-xx-xx.

Equipment: Siwertell ship unloader ST 640 type- D

Work-site: Houston Cement Company L.P. -- Houston Port Cement Terminal  
155 Clinton Dr.  
Galena Park, TX, USA

#### Performance Testing:

The Performance Testing was carried out on xxxx-xx-xx. It was performed in accordance with § 11 "Performance Testing" and with Appendix 6 "Performance Testing Document" to above mentioned contract.

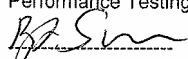
The Actual Guaranteed Rate (1500 mtph) and the Through the Ship Guaranteed Rate (1050 mtph) were determined using the procedures described in § 11 "Performance Testing" and with Appendix 6 "Performance Testing Document" to above mentioned contract.

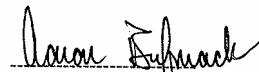
Result:

Unloaded vessel	:	
Draft prior to unloading	:	
Draft after unloading	:	
Unloaded quality	:	43450
Effective testing time	:	40h 52 min
Actual Rate free digging	:	1646 tph
Actual Rate through the ship	:	1063 tph

It is hereby confirmed that the Equipment during Performance Testings has attained the guaranteed performance in accordance with the Contract, § 12 and Performance Testing is complete.

Performance Testing took place on 2006-10-10  
xxxx-xx-xx.

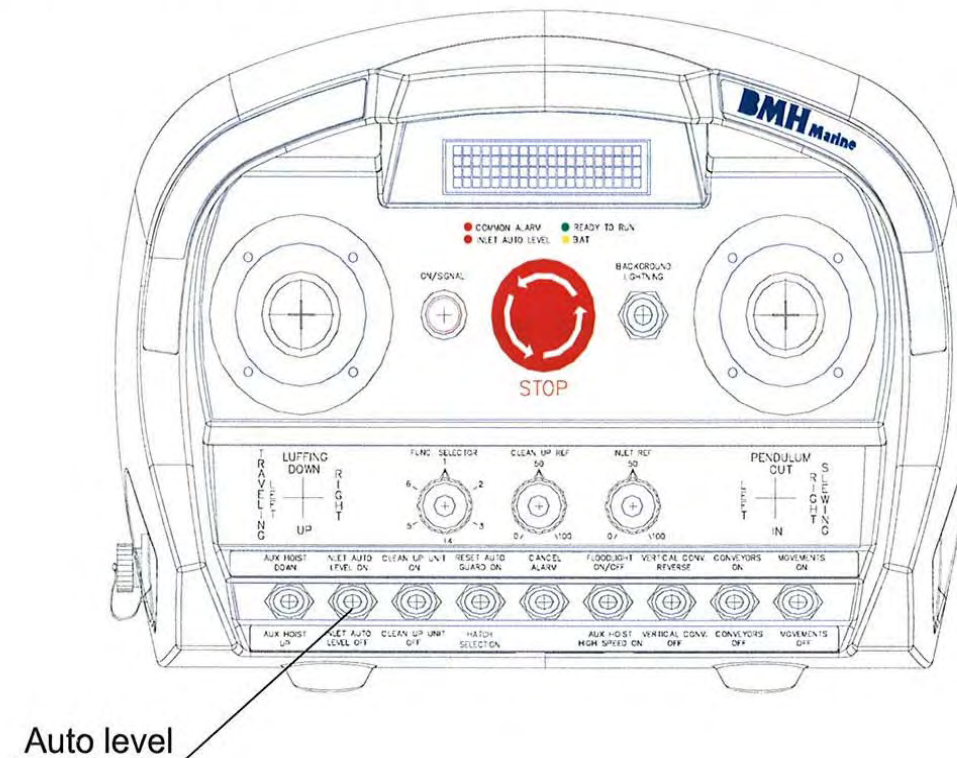
  
Supplier representative

  
Purchaser representative



## Unloading with Auto Level

For the most efficient unloading set the AUTO LEVEL switch to ON, it will keep the inlet head at a constant level. When the pendulum motion is used the luffing motion will automatically start move to keep the inlet head at the same level.



# References – more than 1500 mt/h

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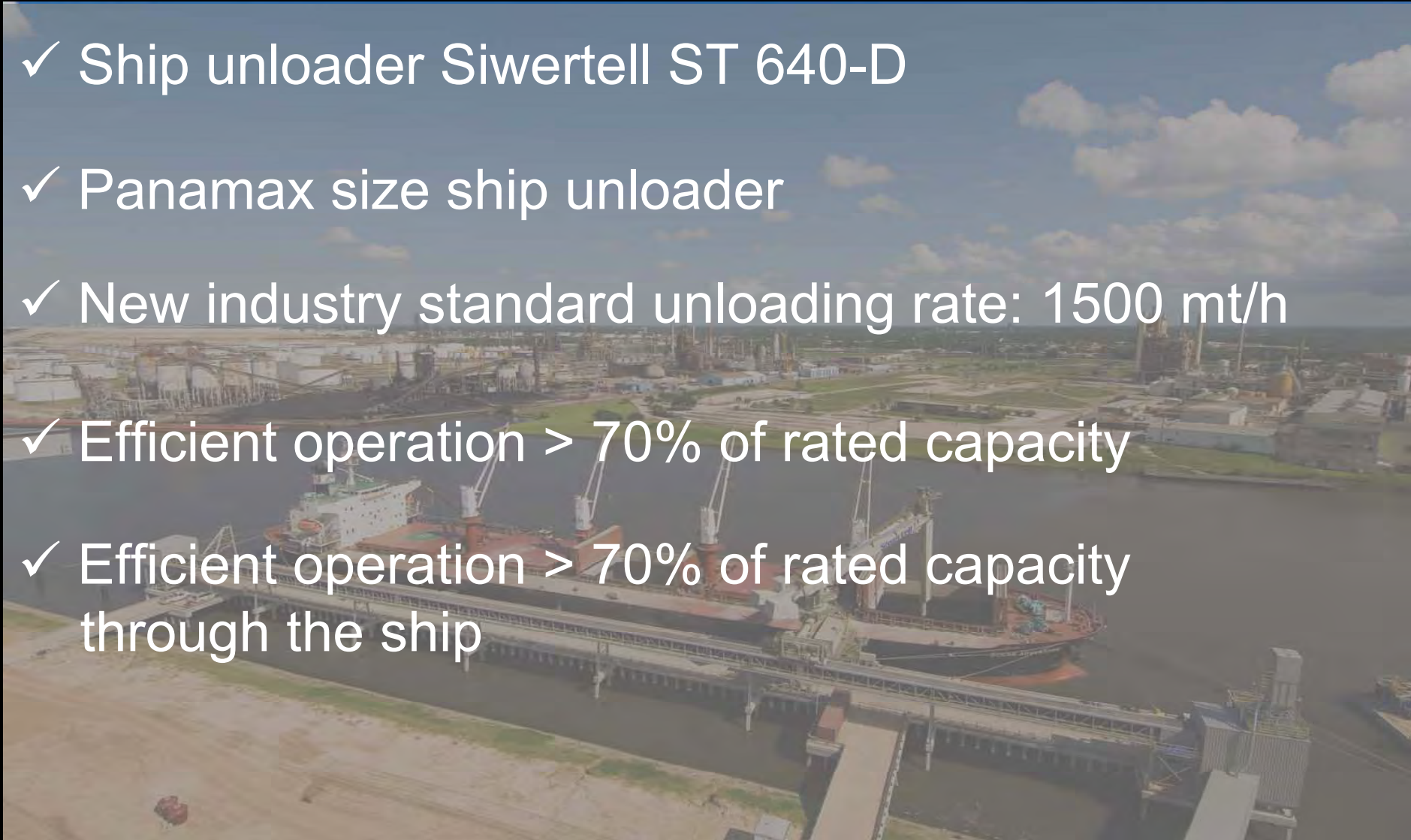
Siwertell

MacGREGOR

Reference list – more than 1500 t/h

Page 1

Type	Version	Shipsize, max	Material	Capacity, rated	Customer	Location	Country	Year
ST 790-D	Rail-mounted	75 000 dwt	Grain, soyabeans	1700-1800 t/h	The Mersey Docks & Harbour Company	Liverpool	U.K.	2006
ST 840-D	Rail-mounted	50 000 dwt	Cement	1500 t/h	The Houston Cement Co., L.P.	Houston, TX	USA	2006
ST 940-D	Rail-mounted	200 000 dwt	Coal	2400 t/h	Hyundai Heavy Industries	Yonghung	Korea	2006
ST 940-D	Rail-mounted	200 000 dwt	Coal	2400 t/h	Hyundai Heavy Industries	Yonghung	Korea	2006
ST 790-D	Rail-mounted	180 000 dwt	Coal	2000 t/h	Mai Liao Power Corp.	Mailiao	Taiwan	2006
ST 790-D	Rail-mounted	180 000 dwt	Coal	2000 t/h	Mai Liao Power Corp.	Mailiao	Taiwan	2006
ST 840-D	Rail-mounted	80 000 dwt	Phosphate rock, sulphur, MOP	1600 t/h	Paradeep Phosphates	Paradeep	India	2005
ST 940-D	Rail-mounted	150 000 dwt	Coal	2400 t/h	Hyundai Heavy Industries	Yonghung	Korea	2003
ST 940-D	Rail-mounted	150 000 dwt	Coal	2400 t/h	Hyundai Heavy Industries	Yonghung	Korea	2003
ST 790-D	Rail-mounted	180 000 dwt	Coal	2000 t/h	Mai Liao Power Corp.	Mailiao	Taiwan	2001
ST 790-D	Rail-mounted	180 000 dwt	Coal	2000 t/h	Mai Liao Power Corp.	Mailiao	Taiwan	2001
ST 790-D	Rail-mounted	180 000 dwt	Coal	2000 t/h	Mai Liao Power Corp.	Mailiao	Taiwan	2001
ST 790-D	Rail-mounted	80 000 dwt	Coal	1000-1500 t/h	Philippine National Power	Calaca	Philippines	1998
ST 790-D	Rail-mounted	80 000 dwt	Coal	1000-1500 t/h	Philippine National Power	Calaca	Philippines	1998
ST 940-D	Rail-mounted	18 m beam	Limestone, coal, gypsum	1000-2300 t/h	Korean Heavy Ind.	Cilacap	Indonesia	1998
ST 790-D	Rail-mounted	100 000 dwt	Coal	2000 t/h	Port of Bourgas Ltd	Bourgas	Bulgaria	1998
ST 790-D	Rail-mounted	45 m beam	Coal	1450-1800	Enel/Reggiane	Brndisi	Italy	1993
ST 790-D	Rail-mounted	43 m beam	Coal	2000 t/h	UBE Industries Ltd	UBE City	Japan	1985

- ✓ Ship unloader Siwertell ST 640-D
  - ✓ Panamax size ship unloader
  - ✓ New industry standard unloading rate: 1500 mt/h
  - ✓ Efficient operation > 70% of rated capacity
  - ✓ Efficient operation > 70% of rated capacity through the ship
- 



# Guaranteed performance

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- 
- The image shows a large red ship's cargo hold being loaded by a conveyor system. The conveyor is a long, inclined structure with a red frame and yellow safety railings. It is positioned over the ship's hold, and a large red container is visible at the top of the conveyor. The ship is docked at a pier, and a body of water is visible in the background. The text is overlaid on the image, providing performance data for the conveyor system.
- Guaranteed rated capacity 2 hr average: 1500 mt/h
  - Achieved rated unloading capacity (2 hr average) 1643 mt/h
  - Guaranteed through the ship capacity: 1050 mt/h
  - Achieved through the ship capacity: 1063 mt/h
  - Energy consumption: 0,40 kWh/ton (through ship)

# Conclusion – why high capacity?

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- ✓ Fast ROI for the additional investment cost going from 800 mt/h to 1500 mt/h
- ✓ Reduction of unloading days by ~ 50%
- ✓ Reduction of berth occupancy by ~ 50%
- ✓ Enables a high annual intake
- ✓ Great savings in ship costs



# Superior Performance by Swedish Technology



# MacGREGOR offices in Sweden and abroad



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

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Fax: +46 42 85899

E-mail:  
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USA representative: Mr Sture Lindgren  
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E-mail: [sture.lindgren@attglobal.net](mailto:sture.lindgren@attglobal.net)  
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