INTERCEM

Workshop 2002

Mr. Thomas Lerch

Complete discharge with FLUITEX® airslide fabrics

Sales Manager
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Germany

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Date of birth:		05.11.1969
Marital status:		Married
Education:		Educated in business and commerce in Hannover
Languages		English, Spanish (basic), German
Employment:	1986 – 1999	13 years in sales, contracts and projects at the spare parts and sales department of Paul Troester Maschinenfabrik, Hannover
	2000 – present	Sales Manager of Mühlen Sohn, Blaustein worldwide

Corporate Profile

Mühlen Sohn GmbH & Co.
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89130 Blaustein
Germany

Tel.: 0049-7304-80100

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Web adress: www.muehlen-sohn.de

Founded: in 1880

Number of Employees: 70

Certification: ISO 9001 since Jan. 1995

General Manager: Mr. Hartmut Bella

The MÜHLEN SOHN Company is the leading manufacturers of heavy industrial woven FLUITEX® fabrics which are used in different industrial applications for pneumatic flow conveying, discharging and aerating of fine or powdered bulk goods.

The most known applications are:

- conveyor systems of chutes (airslides), ventilator systems and aeration systems
- vessel aeration and discharging bottoms in selfunloading ships, railway waggon and silo-truck discharging cones
- discharging systems of domes, silos and tanks, homogenizing systems, mixing equipment

FLUITEX® airslide fabrics are used in **various industries** e.g.:

- cement industry
- aluminum, lime and gypsum industry
- power plants (coal fired)
- pharmaceutical industry
- chemical industry

Of course we can produce to customers' specifications according to their drawings. Depending on the customer‘s request, we can offer airslide fabrics made of different raw materials, in various grades of airpermeability and thickness, depending on the application:

- **FLUITEX® E**, polyester, 4 – 8 mm thick, operating temperature: 150 degrees C permanent, 200 degrees C short-term, recommended for raw meal, cement, lime, gypsum, PVC, fertilizer

- **FLUITEX® EX**, polyester with an antistatic fibre, 4,7 mm thick, operating temperature: 150 degrees C permanent, 200 degrees C short-term, recommended for black powder, coal dust

- **FLUITEX® AD,** para-aramid (Kevlar®), 4 – 5 mm thick, operating temperature: 250 degrees C permanent, 350 degrees C short-term, does not melt, carbonizes and decomposes at 460 - 500 degrees C, recommended for fly ash

- **FLUITEX® AN,** meta-aramid (Nomex®), 4 – 5 mm thick, operating temperature: 250 degrees C permanent, 300 degrees C short-term, does not melt, starts to decompose at 370 degrees, good chemical resistance, recommended for aluminum powder, phosphates, sodium sulphates, acid crystals, washing powder

FLUITEX® fabric rolls in full width, tailor-made sections or cones are always available on stock which ensures speedy delivery times.

Complete discharge with FLUITEX® airslide fabrics

Author and presented by Thomas Lerch
Mühlen Sohn GmbH & Co, Germany

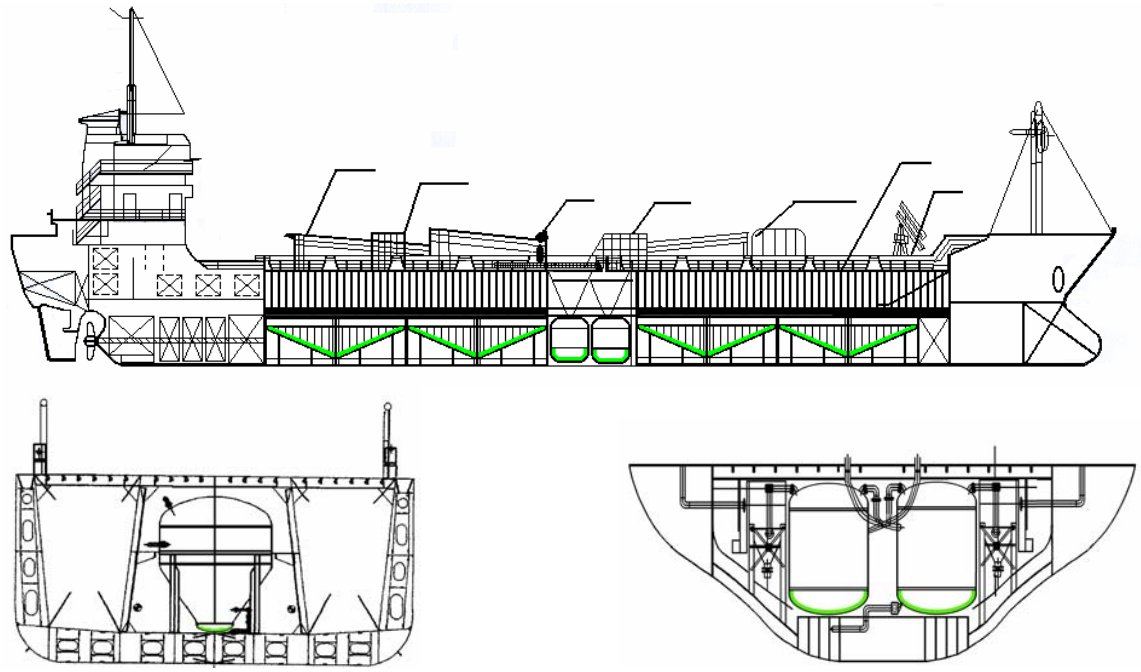
Introduction

FLUITEX® woven fabrics are used in a variety of industries and applications, in every process where bulk materials must be fluidized or conveyed, for example in airslides, ship aeration panels, domes, terminals or silos.
We agree that the woven fabrics are only a minor part in the complexity of the cement shipping industry but regarding the today´s INTERCEM Workshop program, „Cement shipping – Problems Ahead ?“ with focus on maintenance, modifications and practical information, you will notice the difference and importance of FLUITEX® woven fabrics also in order to minimize the shipping costs.

Applications in the maritime environment

The variaty of FLUITEX® applications support different discharging systems installed in riverbarges, off-shore platforms, supply ships and cement carriers.
With cement carrier we mean:

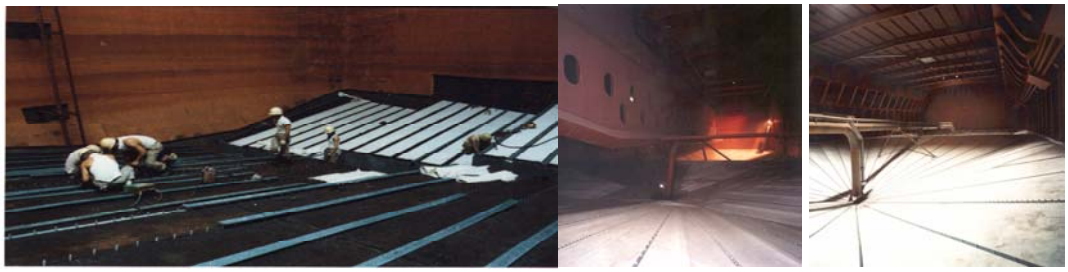
- Dedicated cement carriers, mainly converted bulk carriers where inclined bottoms with aeration panels and FLUITEX® fabrics have been installed.
- Pneumatic selfdischarging cement carrier, with fluidisation panels, flow gate control valves, cement pumps, air compressors and the conveying lines.



FLUITEX applications in cement carriers / vessels

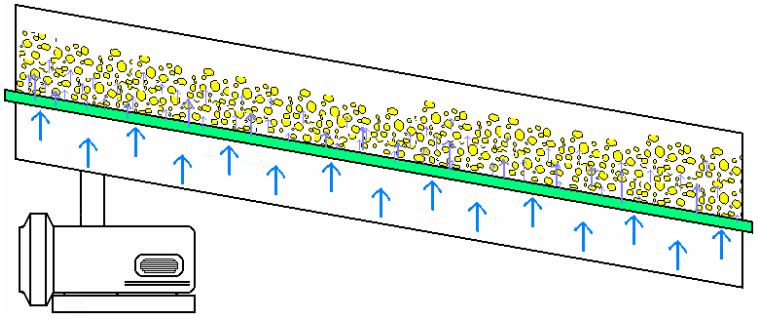
Design of aeration floors

The simple idea of the construction of aeration floors is that, due to the ventilation of the cement, the inclination of the bottom required for cement movement is reduced from about 55° to 15° even up to 10°, depending on the ship design. Due to this reduction, the hold´s cargo capacity is increased by a considerable amount.
The fluidized bottom panels are installed on the tanktop in each hold and are mostly operated through a PLC program to save laytimes of the ship in the port.



aeration panels inside a cement hold (piano-system, pyramide-system)

In accordance to the ship size and type, each manufacturer of aeration floors has it`s own design. Some are talking about a „piano design“ others about a „pyramide system“. In general the floors are consisting of a metal box with air inlet and blower, the sealed FLUITEX® woven fabrics and a mounting flange with bolts.



principle of an aeration-process

The conveying system is based on the principle that bulk goods are conveyed or discharged on a uniform film of air through the inclination of the aeration floor.
At first a blower fills the box with air. In the beginning the FLUITEX® fabric prevents the air from escaping upwards. Only after reaching a constant pressure on the whole surface the compressed air will penetrate through the fabric and enter the cement.
The cement/air mixture becomes fluid and move to the discharging point.
The time between filling the trough/chute and the fluidisation depends on the fabric’s density, the volume to be filled and the power of the blower.

Design of FLUITEX® woven fabrics

Mostly polyester fabrics are used. Polyester yarns are produced in different blends and qualities. Therefore it is important to use only high quality and thoroughly selected Multifilament Polyester yarns. These yarns are pre-shrunk and highly strengthened.
If you examine under the microscope the structure of Multifilament yarn and compare it with the structure of a spun yarn you can easily spot the following advantages:

- The FLUITEX® Multifilament Polyester yarns are consisting of many monofilament endless fibres.

- Compared with the often used Spun yarns you can easily recognize the difference in structure. Spun yarns are made of many short single yarns and therefore with outstanding fibre endings.

Almost every maintenance- or installation manager has the same opinion about woven fabrics, because they are saying: „ fabric is fabric“
But in accordance of the weaving technology and resulting in the raw materials used the fabric design differs much:

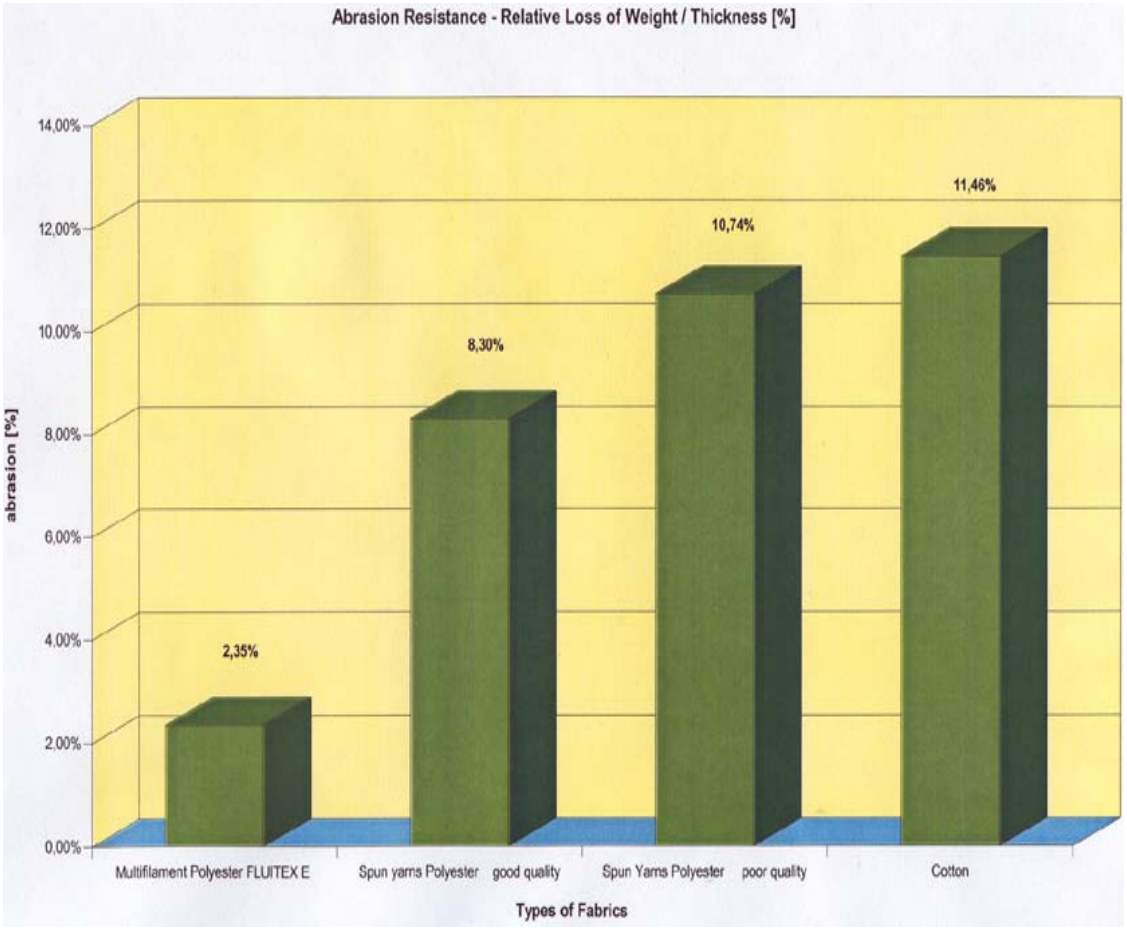
Mühlen Sohn FLUITEX® fabrics made of polyester multifilament yarns

Woven fabrics made of polyester spun yarns

Advantages of FLUITEX® woven fabrics

Up to 5 times longer life expectancy

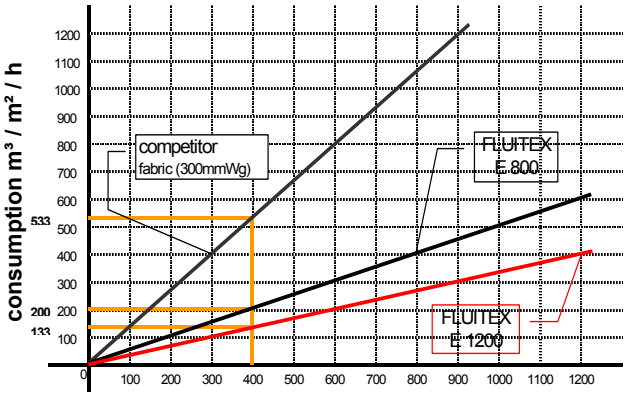
The main problems of caking and clogging are solved by the smooth surface, the moisture rejecting 100% synthetic yarns and the taut weaving structure. This self-cleaning effect counteracts possible processing breakdowns.
Furthermore we would like to draw your attention to a well-known problem:
The residual heavy metal share in cement . Especially zinc, vanadium and lead shorten the life-time of the machine equipment which is in contact with these materials. The company Mühlen Sohn has early recognised this problem and due to the use of high quality raw materials - the formerly mentioned multifilament yarns the life-time of FLUITEX® airslide fabrics has been increased. This point has been confirmed by an independent test programm run at the Technical College in Ulm. They have tested the abrasion, expressed in loss of weight/thickness, of various fabrics in 5 mm thickness.
FLUITEX® fabrics made of mulitfilament yarns with an abrasion of 2,35 % are up to 5 times less abrasive than a fabric made of spun yarns with an abrasion of 10,74 %.



Energy savings

The most used FLUITEX® fabric for the shipping industry are the types
E 800/5: air resist. of 800 mm WG at 400 m³/m²/hrs – fabric thickness = 4,7 mm
E 1200/5: air resist. of 1200 mm WG at 400 m³/m²/hrs – fabric thickness = 4,7 mm
The following data sheet shows, how much air is needed, if the air resistance of the fabric is lower (e.g. only 300 mm WG) than designed of the original machine manufacturer´s (e.g. 800 mm WG).
The consumption of air is calculated with approx. 2 m³/m²/min at a resistance of 40 mbar (0,04 bar=400 mm WG).
To achieve the resistance pressure of 400 mm WG with the FLUITEX® fabric type E 800 (resistance of 800 mm WG), the blower has to supply 200 m³/m²/hrs. Compared to a more permeable fabric, e.g. with a resistance of only 300 mm WG, the blower has to supply 533 m³/m²/hrs. which means almost 3 times more air than with the FLUITEX® fabric type E 800/5.
Beside the high air = energy consumption, also the maintenance effort will increase, e.g. because of changing the air filters.

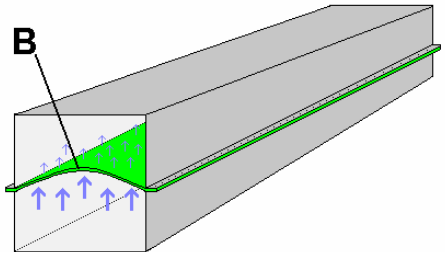
air consumption: 2 m³ / m² / min at 40 mbar



FLUITEX resistance of air flow mmWg

First class form stability

The FLUITEX® multifilament yarns have an extremely high tensile strength and low stretch characteristic. Therefore FLUITEX® fabrics will stay dimensionally stable while keeping their technical functions.
Fabrics made of spun yarns, needlefelts or/and in a smaller thickness than 4-5 mm tend to stretch or wear out due to their constructions. The result of the stretching is reflected in the so called „banana-effect“. This means, that the compressed air blows up the fabric (line B) and therefore the cement is conveyed mainly at the edges of the airslide. As a consequence, the abrasion of the fabric is concentrated at the outer edges.



airslide with fabric („banana-effect“)

Complete discharge

The entire FLUITEX® installation and knowledge of their air permeability characteristics is essential for the economic layout and processing. Since the fluidization system is an important factor to achieve the discharging rates required, the high-sophisticated FLUITEX® fabrics are recommended.

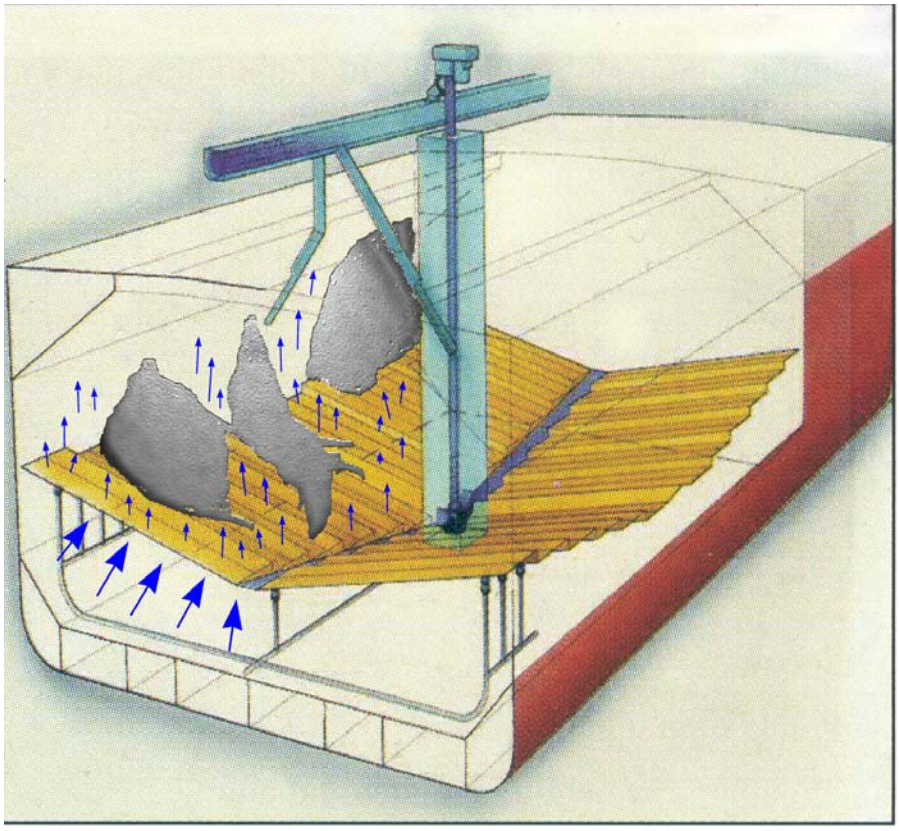
What would happen if the airpermeability is unstable, beside the loss of air = loss of energy, as explained before?

The worst case would be an interruption in the material flow because the air will not be able to penetrate constantly through the fabric and enter the cement.

In the following cases, the air always chose the way of minimal resistance:

- different air permeabilities
- choked pores
- partly covered sections of the fabric

The result are remaining parts of bulk materials, especially in the corners of the aeration panels up to a complete cut off of the conveying route.



aeration floor panels with cement residues

Manuals for the confection and installation

If you are doing the confection of the FLUITEX® fabrics it is strongly recommended to consider the handling constructions, e.g.:

- marking the fabric and cut with a cutting machine or a sharp knife
- after cutting, pull out the edge fibres so that the cross fibre is extruding 3-4 mm
- after punching the holes or cutting, seal the edge with a hot welding iron or with a flame. The polyester should turn light-brown – take care that the fibre is not burned. Sometimes the punching (of the holes) is already made with a hot iron tip.

For the installation process we recommend to seal all flange connections which are in contact with the fabric with a silicone mixture. (Mühlen Sohn always delivers FLUITEX® fabrics with hot sealed edges to avoid pressure loss through the fabric cross section.)

It is very important to stretch the FLUITEX® fabrics taut along the length to achieve a very strengthened aeration surface by approx. 2%, also in order to avoid the above mentioned banana-effect. Stretching of FLUITEX® fabric can be achieved by a clamp stretcher. Test the surface with a bouncing hammer to check whether the FLUITEX® fabric is as taut as possible.

I would be pleased to overhand the handling instructions and a description of the installation procedure for FLUITEX® fabrics in addition to this presentation to anyone who is interested in it. It will be very helpful to persons who are responsible for maintenance and installation.

Please feel free to contact me for any questions now or later on.

I N T E R N / Referenzen

	Schiffsname	Kapazität	Betreiber	Ausrüster	Bemerkungen	Quelle
1	Magaritha	2 x 1500 t	Shark Shipping NL-Antillen	IBAU		Tel. M. Rämele v. 22.03.02
2	Cemstar	2 x 1500 t	Pacific Star, Hbg	IBAU	Umbau der Lisa Lehmann	World Cement 03/02 S. 82
3	?	4 x 550 t	Lafarge	IBAU		WC 03/02 S. 82
4	?	4 x 550 t	Lafarge	IBAU		WC 03/02 S. 82
5	?	4 x 550 t	Lafarge	IBAU		WC 03/02 S. 82
6	Kedah Cement I	4 x 4000 t		IBAU		WC 03/02 S. 92
7	Kedah Cement II	4 x 4000 t		IBAU		WC 03/02 S. 92
8	Kedah Cement III	4 x 4000 t		IBAU		WC 03/02 S. 92
9	Goliath		Goliath Cement	IBAU		WC 03/02 S. 92
10	Koolinda		? Darwin, Australia	H.W. Carlsen	Umbau in 84 ? (10 000 dwt)	Bulk Solids Hand Vol 5, 02/85
11	Cem-K		Apasco, Mexico	H.W. Carlsen	Umbau Ende 01 (12 500 dwt)	WC 03/02 S. 99
12	EBC-One		EBC, Port Harcourt, Nigeria	H.W. Carlsen	Umbau Ende 01 (5.000 dwt)	WC 03/02 S. 99
13	EBC-Two		EBC, Port Harcourt, Nigeria	H.W. Carlsen	Umbau Mitte 01 (5.000 dwt)	WC 03/02 S. 99
	in Auftrag (neu) für Ostasien			H.W. Carlsen	Fertigstelg. 03 (10.000 dwt)	WC 03/02 S. 100
	in Auftrag (Umbau) für Ostasien			H.W. Carlsen	Umbau Mitte 02 (15.000 dwt)	WC 03/02 S. 100
	Koralia		Transocean / Marine Cement	IBAU		Int. Cem. Rev. 12/95, S. 52
	Bamburi		Transocean / Bamburi Portland Cem. Mombasa			ICR 12/95, S. 52
	Cementia		Transocean		1967 gebaut	ICR 12/95, S. 52
	Cemsa		Coral Sea Shipping Comp.	Merewido	95 gebaut	C. Schouten/96
	Atlantis	2 x 20m³	Transinsular SA Lissabon, Portug	Merewido	97/98 gebaut (6.150 dwt)	Merewido-Ordn.
	Pacific Seagull	3 x ?	Azuma Shipping/ Taiheiyo Cem. Japan	BMH Marine	00 gebaut (10.000 dwt)	ICR 10/00 S. 59
	Chihaya Maru	3 x ?	Kinkai Yusen Kaisha/ Taiheiyo Cem. Japan	BMH Marine	00 gebaut (10.000 dwt)	ICR 10/00 S. 59
	Pacific Falcon	3 x ?	Azuma Shipping/ Taiheiyo Cem. Japan	BMH Marine	00 gebaut (10.000 dwt)	ICR 10/00 S. 59
	Asano Excelsior		Nihon Cement Japan	BMH Marine	97 gebaut (20.800 dwt)	ICR 10/00 S. 60
	Sohyo Maru		Taiheiyo Cem. Co, Japan	BMH Marine	97/98 gebaut Granulat u. Pulver	BMH Referenzl.
	Genyo Maru		Nihon Cement Japan	BMH Marine	97 gebaut	ICR 10/00 S. 62 BMH Referenzl.

Kontaktaufnahme während der INTERCEM / Amsterdam

NAME	FIRMA	Besprechungspunkte
Dr. Polomsky	Transocean Hamburg	- Wo wird in Rotterdam Zement umgeschlagen ? - Welchen Namen haben die 15+1 Schiffe, die in TO-Besitz sind (mit Geweben) u. welche Werke haben diese gemietet ? - Wann wird das +1 Schiffsprojekt (1.500 m²) entschieden ? - Wer führt die Reparaturen durch (Belüftungsböden)
Mario Rämmele	IBAU, Hamburg	- Referenzen abgleichen - Wer sind internationale Wettbewerber ?
Jan Karlsson	BMH Marine, Schweden	- Kopie der Präsentation für Thomas Karlsson übergeben. - Wer liefert Gewebe, wenn in Japan oder Korea gebaut wird ? - Wer sind internationale Wettbewerber ?
Göran Hakansson	H.W. Carlsen, Schweden	- Was macht sein Bruder zur Zeit in ... (China, Australien ?) - Welche Firma in GB stellt das dünne (mm?) Gewebe her ? - Wer sind internationale Wettbewerber ?
Wijnand van Aalst	Merewido, Niederlande	- Kopie der Präsentation für Hans van de Ruit übergeben. - Wer sind internationale Wettbewerber ? - Zahlungsverzögerungen
Jens Faber Andersen	Faber Shipping ApS	- Gruß von Cornelius Schouten
Alf Anderson	Belden Shipping Norwegen / Singapur	- Gruß von Cornelius Schouten
Dieter Ronen	Intership Navigaton Zypern	- Gruß von Cornelius Schouten