

WORLD CEMENT

THE CEMENT INDUSTRY'S NO. 1 TECHNICAL JOURNAL

Proudly Shines Morning Star

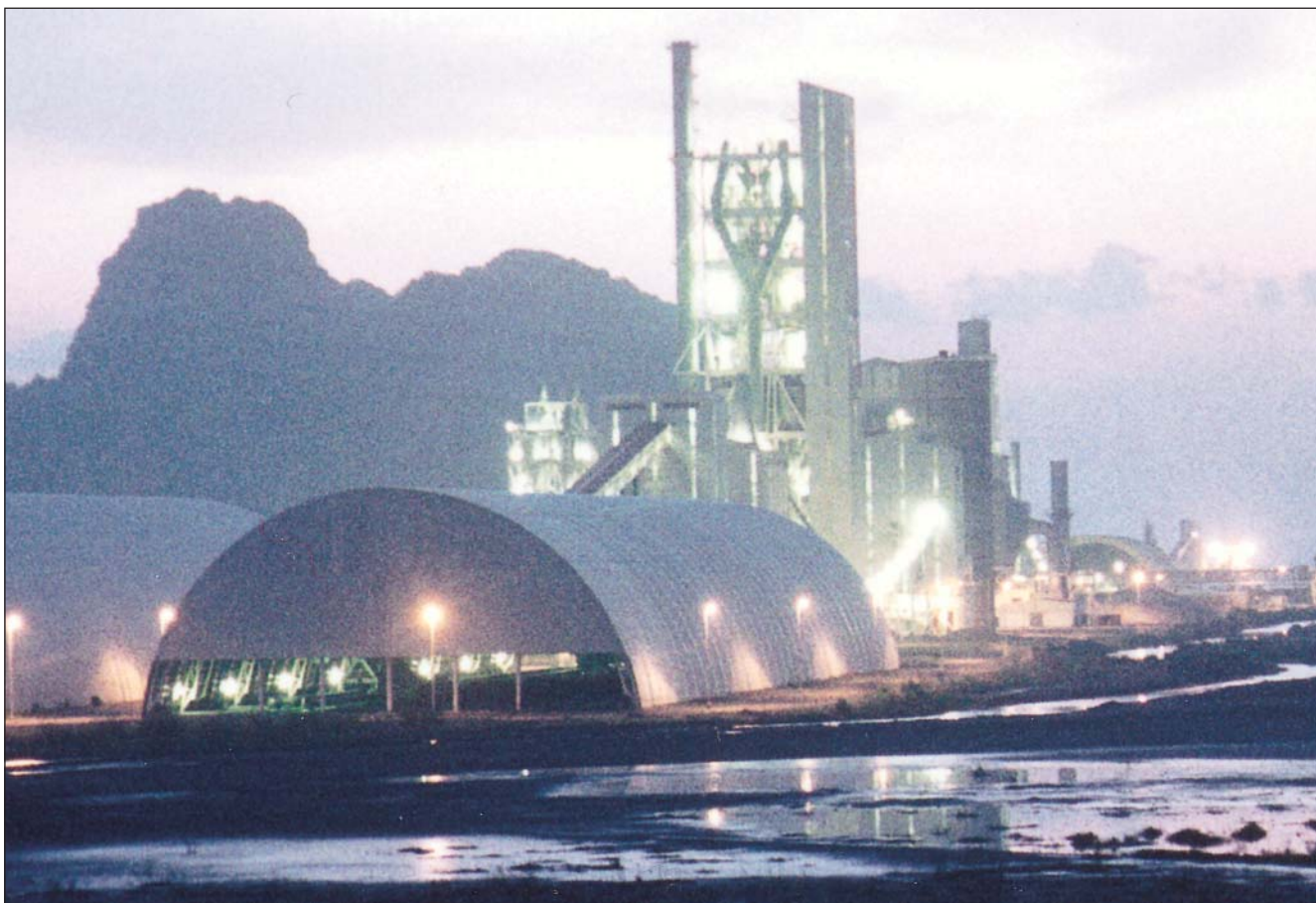


ABB Switzerland Ltd
Minerals & Mining
CH-5401 Baden-Dättwil
Switzerland

Telephone: +41 (0)58 586 8444
Fax: +41 (0)58 486 7333
E-mail: process.industries@ch.abb.com
www.abb.com/cement

ABB

Reprinted from **World Cement** February 1999

Proudly shines

Morning Star's new 1.4 million tpa plant at Hon Chong, Vietnam, which was inaugurated last November, represents the successful completion of a major investment programme which began in the autumn of 1995. Paul Maxwell-Cook recently visited the plant and the company's Cat Lai terminal near Ho Chi Minh City.

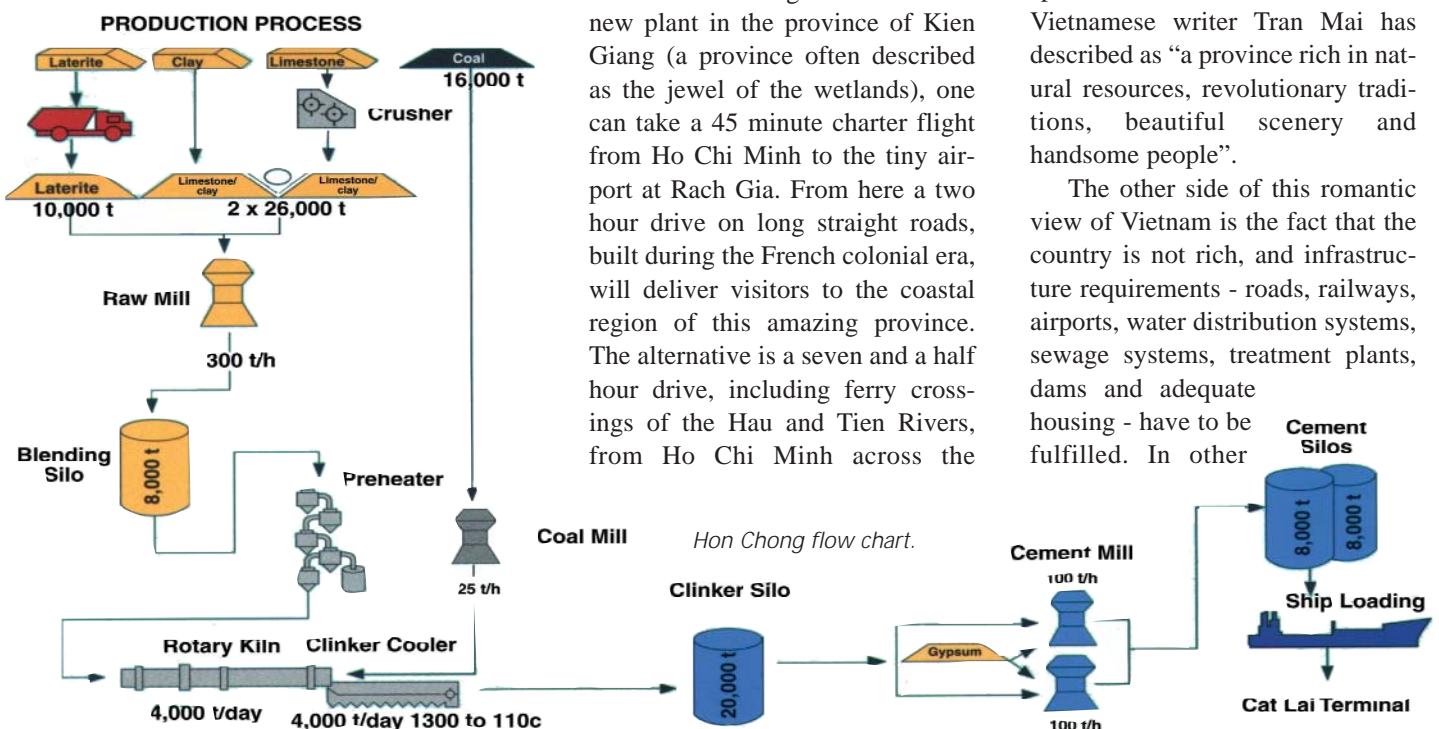


Introduction

To reach Morning Star Cement's new plant in the province of Kien Giang (a province often described as the jewel of the wetlands), one can take a 45 minute charter flight from Ho Chi Minh to the tiny airport at Rach Gia. From here a two hour drive on long straight roads, built during the French colonial era, will deliver visitors to the coastal region of this amazing province. The alternative is a seven and a half hour drive, including ferry crossings of the Hau and Tien Rivers, from Ho Chi Minh across the

Mekong Delta. Both trips provide spectacular views of what the Vietnamese writer Tran Mai has described as "a province rich in natural resources, revolutionary traditions, beautiful scenery and handsome people".

The other side of this romantic view of Vietnam is the fact that the country is not rich, and infrastructure requirements - roads, railways, airports, water distribution systems, sewage systems, treatment plants, dams and adequate housing - have to be fulfilled. In other



Morning Star



words, all projects which will require massive amounts of cement. Ueli Hartmann, Chief Executive of Morning Star Cement, sees the supply and demand in cement as being more or less balanced at present with no signs of collapse of the market. On a per capita basis, Vietnam's consumption is about 130 kg per annum: well below the level in surrounding countries. Some 50% of the country's cement capacity is currently produced in modern plants, but the rest comes from outdated and inefficient plants. In the years to come, many of the old plants will have to be replaced, thus creating opportunities for large scale cement plants. Indeed, the modernisation of several plants are well underway.

Joint venture

In the late 1980s, Vietnam began to encourage direct foreign investment. This attracted major cement manufacturers to seek opportunities for establishing and building major cement projects. Liberal legislation had been introduced enabling companies to acquire a majority stake. So

it was in 1990 that Holderbank's interests in the country began to accelerate and take hold with the commissioning of a feasibility study.

Project studies and preliminary discussions involving evaluations of various locations, technical concepts and options for facility layout plans took place over 18 months, and led to a joint venture agreement in December 1993. Morning Star Cement (owned 65% by Holderbank and 35% by the state owned Ha Tien I Cement Co.) was thus founded with a share capital of US\$ 122 million. Construction of the Cat Lai terminal near to Ho Chi Minh city began in 1994, followed by the preparation of the Hon Chong site in 1995.

Project concept

Holderbank's studies clearly indicated that any investment in a cement project would have to be located in the south of the country. The following features were key in decisions regarding the location of the plant:

- Limestone deposits are very unevenly distributed in Vietnam. The limestone formation around Ha Tien and Hon Chong are said to be the only economically workable deposits in the south. The closest raw material reserves of any significance are 800 km to the north of *Da Nang*.
- Southern Vietnam, from the Mekong Delta up to *Da Nang* generates two thirds of the country's GDP. This is predicted to remain Vietnam's economic driving force in the future based on a fair degree of infrastructure and keen local business sense.
- South Vietnam's cement consumption is higher than in the other regions (higher added value and broader income base).

The Hon Chong plant

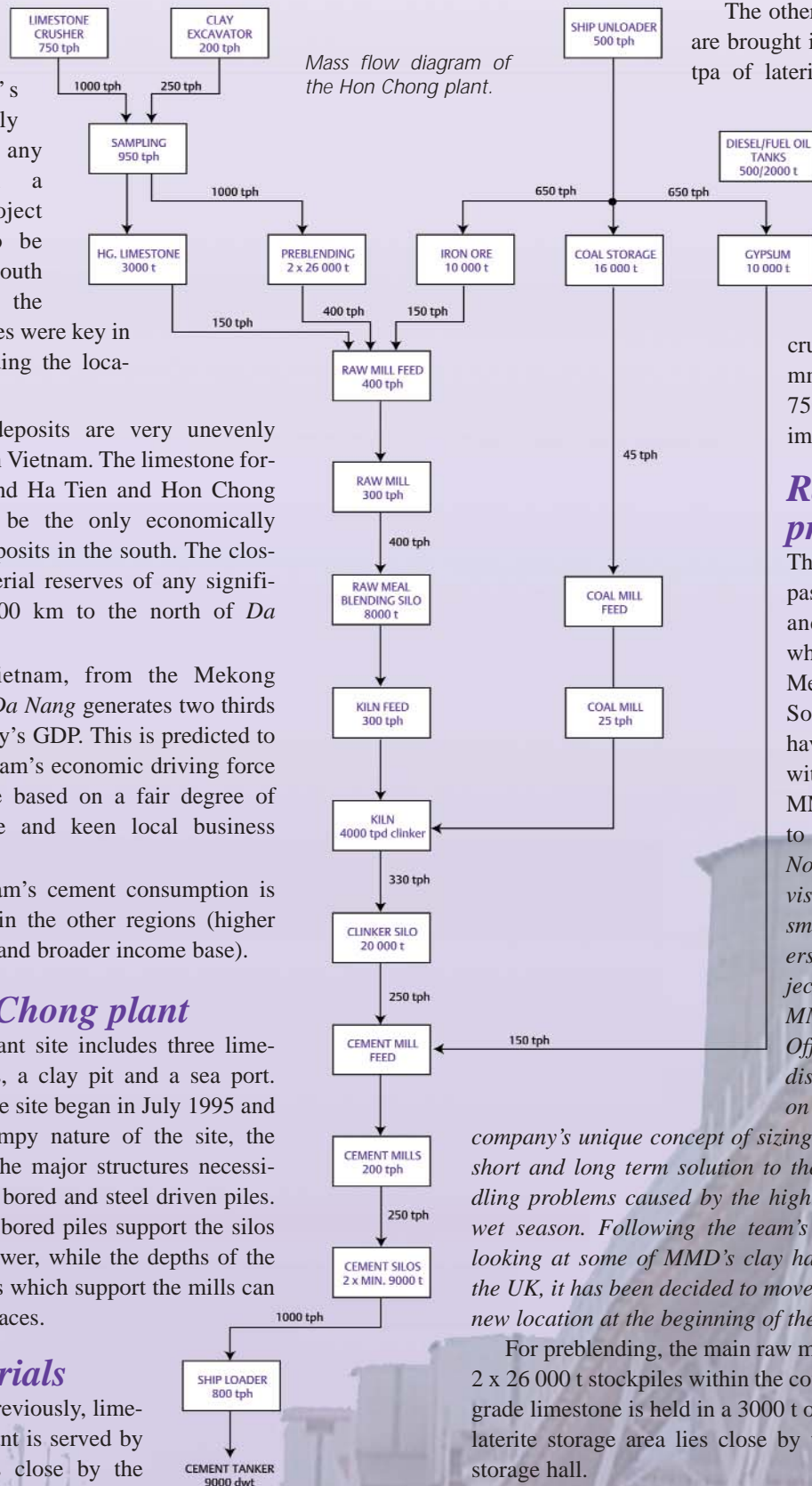
The 5-6 km² plant site includes three limestone mountains, a clay pit and a sea port. Excavation of the site began in July 1995 and due to the swampy nature of the site, the foundations of the major structures necessitated 100 km of bored and steel driven piles. Some 20 km of bored piles support the silos and preheater tower, while the depths of the steel driven piles which support the mills can reach 40 m in places.

Raw materials

As mentioned previously, limestone for the plant is served by three mountains close by the plant. The other major raw material component, clay, is excavated from a deep clay pit on site.

After drilling using Atlas Copco drills, the limestone is blasted from the quarry face, recovered by excavators and continuously transported to the primary crusher house by 40 t Caterpillar trucks. The clay is won by means of a P.S. bucket excavator delivering at 200 tph.

Mass flow diagram of the Hon Chong plant.



The other raw materials which are brought in by ship, are 18 000 tpa of laterite (iron oxide) from *Bien Hoa* in the *Dong Nai* province, 70 000 tpa of gypsum from Thailand and 150 000 tpa of coal from the north of Vietnam. Primary crushing to less than 120 mm is carried out by a 750 tph PSP-designed impact crusher.

Raw meal preparation

The limestone and clay pass through the transfer and analysing station which houses a Gamma Metrics PGNA analyser. Some initial problems have been encountered with clay handling. An MMD crusher is helping to alleviate the problem. *Note: Since the writer's visit to Hon Chong, a small team of key players involved in the project recently visited the MMD Group Head Office in the UK. Here discussions took place on the application of the*

company's unique concept of sizing material for both the short and long term solution to the clay limestone handling problems caused by the high moisture level in the wet season. Following the team's visit which included looking at some of MMD's clay handling installation in the UK, it has been decided to move the existing sizer to a new location at the beginning of the clay plant.

For preblending, the main raw materials are stacked in 2 x 26 000 t stockpiles within the covered area, while high grade limestone is held in a 3000 t open store. The 10 000 laterite storage area lies close by the main preblending storage hall.

After preblending, the chemically balanced raw mix passes through the mill feed system, to the 300 tph Loesche LM 46.4 roller mill powered by a 2500 kW motor. The mill is fed with hot gases from the kiln to dry the raw mix to less than 1% humidity. The dried material is then conveyed to a 8000 t capacity blending silo supplied by IBAU HAMBURG, where continuous homogenisation ensures the correct raw meal preparation prior to preheating.



Limestone being delivered to the 750 tph impact crusher.



The 300 tph Loesche raw meal vertical roller mill.

Pyroprocessing system

The 110 m high steel structure houses the double string 5-stage preheater. The 4.6 m dia. x 72 m long dry kiln utilises three supports, has an inclination of 3.5% and is powered by a 540 kW motor. It was designed for 4000 tpd capacity.

The kiln is coal fired via ROTOFLAM® burners supplied by Pillard. The covered coal storage area is located alongside the limestone/clay storage area. After arriving at the plant, the coal is stacked, and then reclaimed by MVT machines. Prior to kiln firing the coal is pulverised in a 25 tph Loesche LM 27.20 D coal mill, driven by a 500 kW motor. Dedusting of the coal mill is via bag filters. The 7.0 m dia. x 31.89 m high kiln gas conditioning tower was supplied by Elex. The company also supplied the two electrostatic precipitators for dedusting of kiln and grate cooler gas.

An IKN Pendulum cooler cools the clinker to 70 °C above ambient. The cooler is driven by a single hydraulic cylinder. The clinker is crushed by a 120 kW hammer crusher.

Cement grinding and storage

The crushed clinker is stored in a 20 000 t silo before final milling in 2 x 100 tph Loesche LM 46 C 2+ 2 roller mills. Both mills utilise Loesche separators. Gypsum (at 5% content) is added at this stage to produce the final

high quality OPC. Dedusting is effected by bag filters and the final cement is stored in 2 x 9000 t concrete silos.

Hon Chong Port

Morning Star's own port includes a channel 68 m wide, 7.8 m deep and 15 km in length. The entire production of cement is shipped via the company's two dedicated 9000 dwt vessels. The port receives all incoming materials mentioned earlier including 30 000 t of fuel oil. The fuel oil is used for the plant's own power plant, which generates up to 6 x 5.5 MW of electrical power for the plant. The power plant and electrical system were supplied by ABB/Wartsila.

Central control

The plant employs the ABB Advant OCS process control system. By using ABB systems for control, power and data processing, the Hon Chong plant has central control capability. The ABB Advant OCS process control system allows continuous monitoring with a high degree of flexibility of the displayed data. The Advant system interfaces to field devices through the ABB Master-bus DCS. The ABB VVVF drives are directly coupled to the Master-bus LAN network providing yet another access to valuable information and commands from the Advant OCS. The extensive use of ABB motors and switchgear complete the electrical system.



Part of the power plant.

The process control network also features kiln shell scanning with a Thermoteknix Centurion scanner.



Cement being loaded onto one of Morning Star Cement's 9000 dwt vessels.

The central control room is uncluttered and spacious this is possible because of the use of operator stations consisting of customised ABB keypads and large Nokia monitors. The hub of the cement process, the pyroprocessing section, is immediately obvious through the large picture windows of the control room.

A partnership...

As mentioned in the main article, Morning Star Cement Ltd is a joint venture which was established in December 1993 under the Foreign Investment Law of Vietnam. The government licence was issued for a 50 year term by the State Committee for Cooperation and Investment (SCCI).

Morning Star's Board of Directors consists of four representatives of 'Holderbank' and two delegates nominated by the joint-venture partner Ha Tien I, or the VNCC (Vietnamese National Cement Corp.). The management board of Morning Star consists of two Vietnamese and six expatriate directors of various nationalities. The remaining management level

consists of 25 Vietnamese nationals together with seven expatriates. The level of superintendents and supervisors is filled entirely with Vietnamese staff. The majority of staff had absolutely no prior experience in the cement process: they all came from other sectors and had to be trained. With the exception of a small number of people seconded by the company's partner Ha Tien I, the majority of the engineers have been recruited directly from university. With the assistance of 'Holderbank', these engineers have received basic training in cement technology, while having to learn English at the same time. As Morning Star's CEO Ueli Hartmann points out, a basic level

of skills has been reached, but is not yet completely satisfactory, and training is still of paramount importance. In order to run the plant efficiently and safely, a 'coaching' concept has been introduced, whereby experienced members of staff of other 'Holderbank' group companies as well as other firms have been engaged to spend a number of months at the plant to pass on their know-how and experience on site. In addition, an international exchange programme has been set up that will allow two young engineers - hopefully four in the future - to gain experience at Morning Star. Meanwhile, their Vietnamese colleagues are being sent to another 'Holderbank' Group company.



Coal storage building

Environmental considerations

The Hon Chong plant conforms with international environmental protection standards. Studies were conducted on the environmental impact during the planning stage and on the socio-economic impact of the cement plant itself. Construction of the plant was approved by the corresponding environmental authorities of Ho Chi Minh City and the Kien Giang province and also by the environmental department of the World Bank. The industrial water used in the plant and at the Cat Lai terminal is fully recycled and is not discharged into the environment. Sewage water is treated, converted into industrial water and reused. Dust emission from ESPs is kept at below 50 mg/Nm³, corresponding to the strictest of international standards.

Local development

One of Morning Star's missions is to create a friendly and professional working environment. Constant training is provided including exposing to an international environment and interests. The company is currently building a village for its staff close by the plant where apartments have been built into the hillside, with magnificent views across the sea to the many islands which adorn this part of the coastline. A club house and swimming pool is also under construction in the village. Future plans



Ship unloader at the Hon Chong jetty.



Raw meal blending silo and preheater tower.



Cooler deduster.

by the company include major improvements to the main road from this and other villages to the plant.

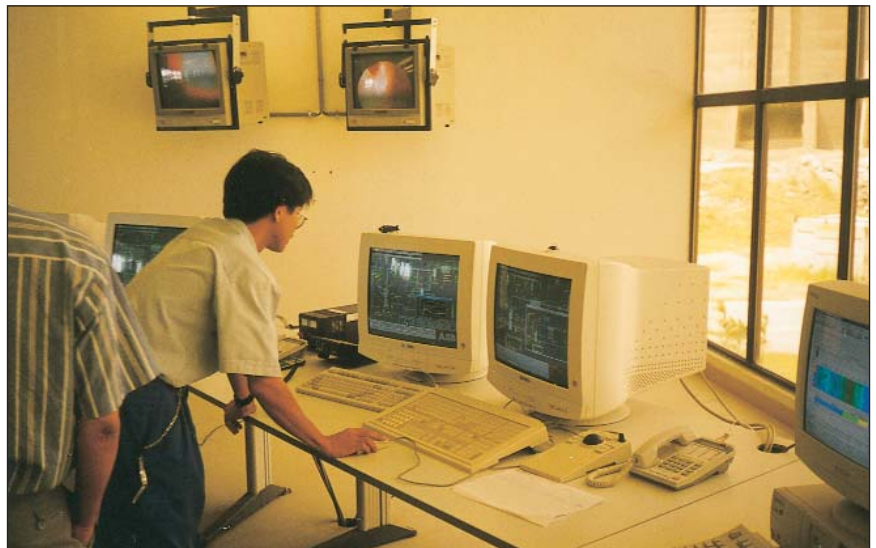
Markets and market share

Morning Star serves three distinct geographical markets, namely Ho Chi Minh City, the Mekong Delta and the adjacent provinces to the north of Ho Chi Minh. The main market of Ho Chi Minh City accounts for approximately 60% of the company's output, while the other two areas share the rest in equal proportions. Ueli Hartmann explained that Morning Star had segmented the market into three channels (traders, concrete producers and end-users). Three types of cement are supplied, with the standard Portland cement covering more than 90% of all sales. The higher strength cement is for use in bridges and high rise buildings.

At the time of writing, Morning Star predicted that the cement market in Vietnam would show a demand of approximately 10 million t, compared with a theoretical capacity of around 12 million t. This supply/demand relation is a healthy one and compares very favourably with most of the surrounding countries. Official expectations are for demand to grow to

approximately 13 million t by the year 2002. Morning Star would expect to gain a market share of around 14% of the total market and a share of 40% in the main markets.

Holderbank's Far East area manager, Paul Hugentobler, who with Urs Bieri (a member of Holderbank's Executive Committee) first travelled to Vietnam in 1990 and initiated the original project concept, suggested at a recent press conference that the task was to capture a strong market position in what has

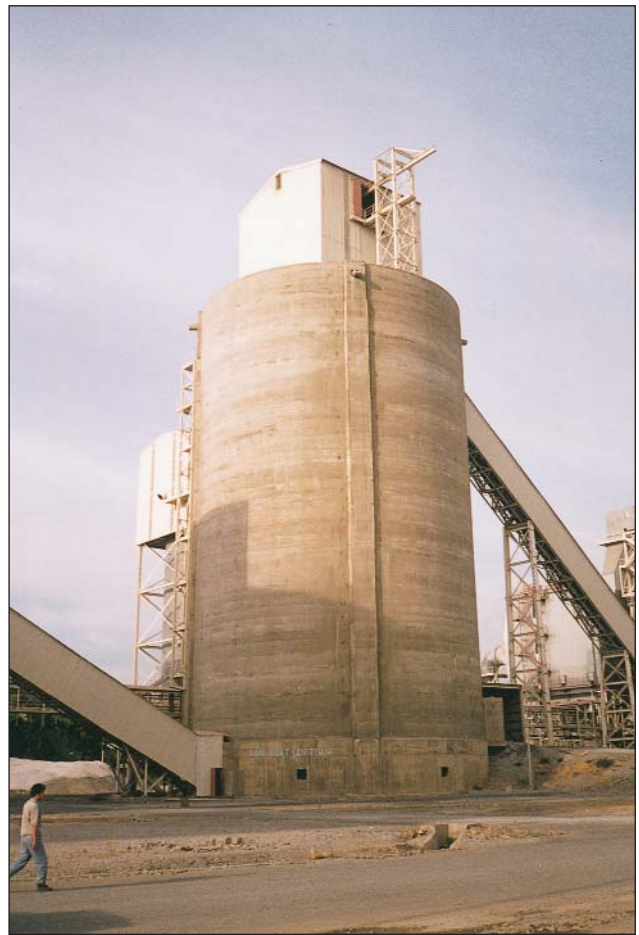


Central control room.

become a difficult environment. The commissioning of the Hon Chong plant coincided with the Asia crisis, which as elsewhere has dampened Vietnam's economic activity. The number of new capital projects - financed by investors from Asia-Pacific - has fallen sharply. However despite these negative macro-economic conditions, cement consumption has held up remarkably well.

Holderbank now hopes that the Vietnamese government will pursue a policy of rapidly opening up the economy. This will help Vietnam to become a more attractive destination again for direct investment and speed up the completion of urgently needed projects to improve the infrastructure. In recent years, the multilateral financial institutes have promised loans amounting to US\$ 2-3 billion per annum. However, these projects are making slow headway. The infrastructure boom has been hamstrung by a combination of government officials' inexperience in project implementation and a low-key policy on debt. Releasing this latent pent-up demand will be the decisive factor in the future, ensuring a higher level of capacity utilisation for the cement industry.

With optimisation of the technical facilities at Hon Chong now completed, Morning Star Cement is well prepared for the next upsizing when it eventually arrives. The creation of the company was a unique opportunity for Holderbank in not only contributing to the development of Vietnam, but also in winning a key strategic position in a highly challenging and promising market.



Clinker storage silo.

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ABB Switzerland Ltd
Minerals & Mining
CH-5401 Baden-Dättwil
Switzerland

Telephone: +41 (0)58 586 8444
Fax: +41 (0)58 486 7333
E-mail: process.industries@ch.abb.com
www.abb.com/cement

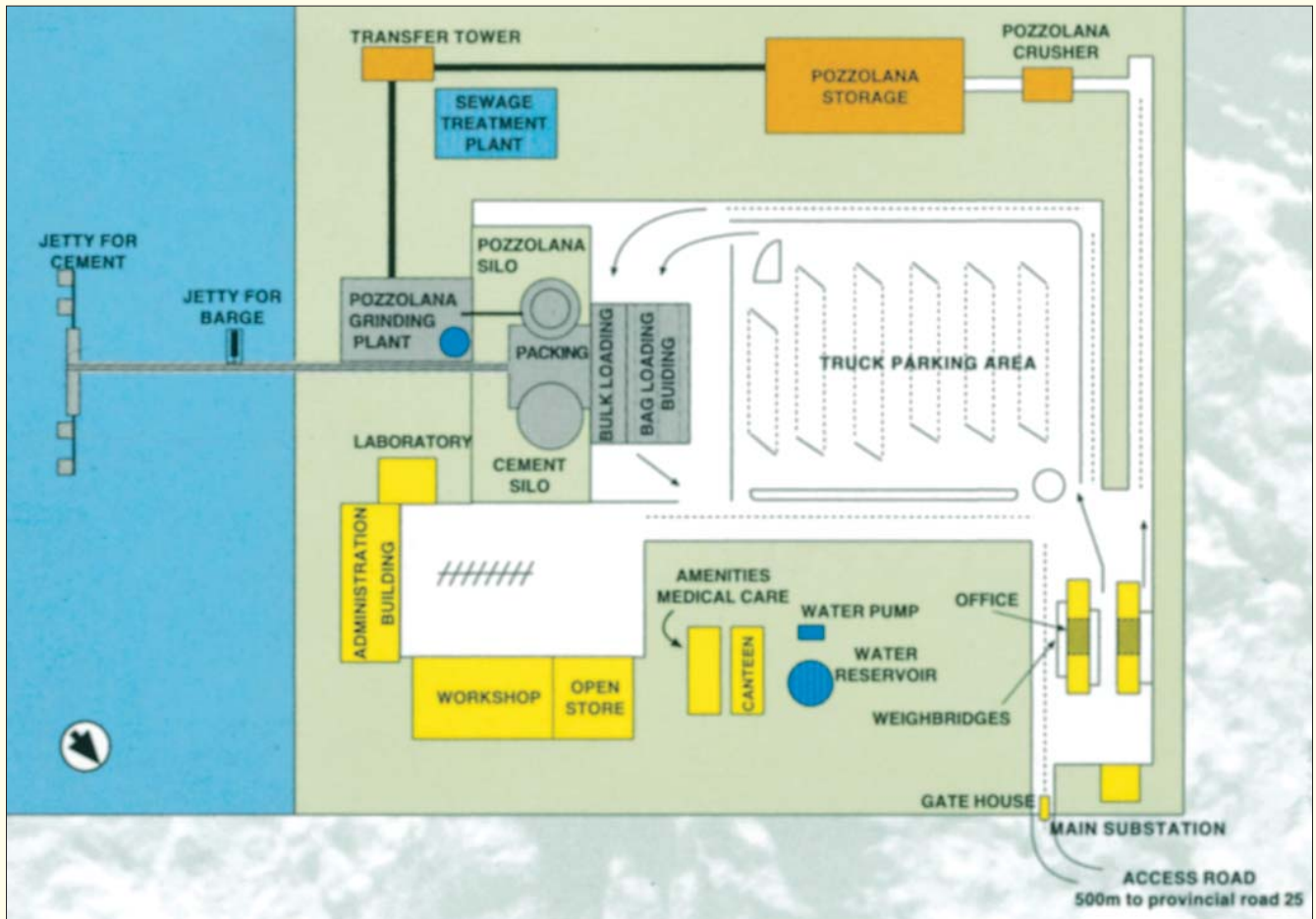


Cement storage silos.

Hon Chong plant: main equipment and suppliers

Main consortium: Kobelco, Japan and MVT Bernhard Blatton, Germany, with individual equipment as follows:		
Equipment	Details	Manufacturer
Limestone quarry		
Drilling equipment	2 x ROC 830 + 1 x ROC 742 (20 m/h)	Atlas Copco
Excavator	900 tph, 5080	Caterpillar
Dump truck	4 x 40 t	Caterpillar
Clay pit		
Bucket excavator	200 tph	PS Engineering
Raw material analyser	PGNA analyser	Gamma-Metrics
Limestone impact crusher	750 tph, 1120 kW	PSP Engineering
Limestone/clay stacker	1000 tph, 70 kW	MVT
Limestone/clay reclaimers	400 tph, 110 kW	MVT
Raw mill (vertical roller mill)	300 tph, 2500 kW, LM 46.4	Loesche
Separator	300 tph, 90 kW, LDKS 83	Loesche
Blending silo	8000 t	IBAU HAMBURG
Preheater	5 stage, double string	KOBE
Kiln	4.6 m dia. x 72 m, 3 support, 4000 tpd	KOBE
Main drive	540 kW	ABB
Burner (coal fired)	ROTAFLAM®	Pillard
Refractories		Siam Refractories
Infrared kiln scanner	Centurion + WinCem Software	Thermoteknix
Clinker cooler	4000 tpd, single grate + fix inlet plates	IKN
Clinker crusher	Hammer mill, 1120 kW	IKN
Coal stacker	500 tph, 50 kW	MVT
Coal reclaimers	100 tph, 50 kW	MVT
Coal mill (vertical roller mill)	25 tph, 500 kW, LM 27.2 D	Loesche
Separator	25 tph, 37 kW, LKSD	Loesche
Clinker storage silo	20 000 t	Aumund
Gypsum stacker	500 tph, 44 kW	MVT
Laterite stacker	500 tph, 44 kW	MVT
Cement grinding (vertical roller mills)	2 x 100 tph, LM 46 C 2+ 2 and separators	Loesche
Cement storage silos	2x 9000 t	IBAU HAMBURG
Ship loader (cement)	800 tph, 40 kW	MVT
Ship unloader (coal, laterite, gypsum)	500 tph, 290 kW	MVT
Electrostatic precipitator	kiln/raw mill gas <50 mg/Nm ³ Clinker cooler 6.55 g/m ³ <50 mg/Nm ³	Elex
Conditioning tower	7.2 m dia. x 31.89 m, 4280 m ³ /min	Elex
Bag filters		Interoller
Bucket elevators		Aumund
Clinker conveyors		Beumer
Belt conveyors		MVT
ESP withdrawal conveyor		Gambarotta-Gschwendt
Laboratory equipment	X-ray/XRF	ARL
Power station/electrical	6 x 5.5 MW	ABB
Power station/engines	6 x 16V 32, 8000 HP, turbocharged	Wartsila

Cat Lai terminal



Plan of the Cat Lai cement terminal.



Bags containing PCB 30 being truck loaded.

Main equipment and suppliers: Cat Lai Terminal	
Handling system (pozzolana)	FAM
Pozzolana mill	Gebr. Pfeiffer
Process control system	Siemens
Laboratory equipment	ARL
Bag packing machines	MVT
Storage silos	MVT

The Cat Lai terminal is located on the Dong Nai River 14 km from Ho Chi Minh City and about 600 km from the Hon Chong plant. The round trip from the plant to the terminal takes approximately four days, including loading and unloading. The terminal receives cement by means of the two dedicated 9000 dwt self-unloading ships, but it can also accommodate ships which arrive from North Vietnam and bulk vessels up to 20 000 dwt.

On arrival, cement is pumped directly into two 68 m high silos, the combined capacity of which is 40 000 t. The terminal also receives and handles over 200 000 tpa of pozzolana. This is delivered by truck from Vung Tau Province, some 100 km away. The pozzolana is crushed in a 300 tph hammer crusher and then stored in a 5000 t capacity covered building. From here the material is transferred to the crusher house where it is finely ground in a Pfeiffer mill and then blended in optimum proportions with the cement from the Hon Chong plant to produce PCB 30 cement. This



Approaching the terminal along the Dong Nai River. The 65 m high silos store ordinary Portland cement (right) and pozzolana blended cement (left).



Unloading cement from one of the company's vessels at the terminal.

Portland blended cement is suitable for use in Vietnam's tropical climate and high humidity. It is particularly useful for domestic housing and general purpose applications where high early strength is not necessary.

There are four packing machines at Cat Lai terminal each with the capacity to pack 100 tph of cement in 50 kg bags. Belt conveyors are employed to load the bags onto trucks or to transport them to the barges. One bulk cement facility was designed and installed to cover the demand from ready-mixed companies and large industrial users. The terminal is equipped to handle up to 2.5 million tpa.

The pozzolana materials handling equipment was designed and installed by FAM.

Commissioning of the terminal as an export terminal began in February 1997, and commissioning of the first cement carrier in January 1998. Commissioning of the Hon



Pozzolana grinding plant building on the right with transfer tower in the background. Materials handling equipment and buildings were designed and built by FAM.

Chong plant began in February 1998, followed by clinker and cement production, and the second cement ship in April 1998.

