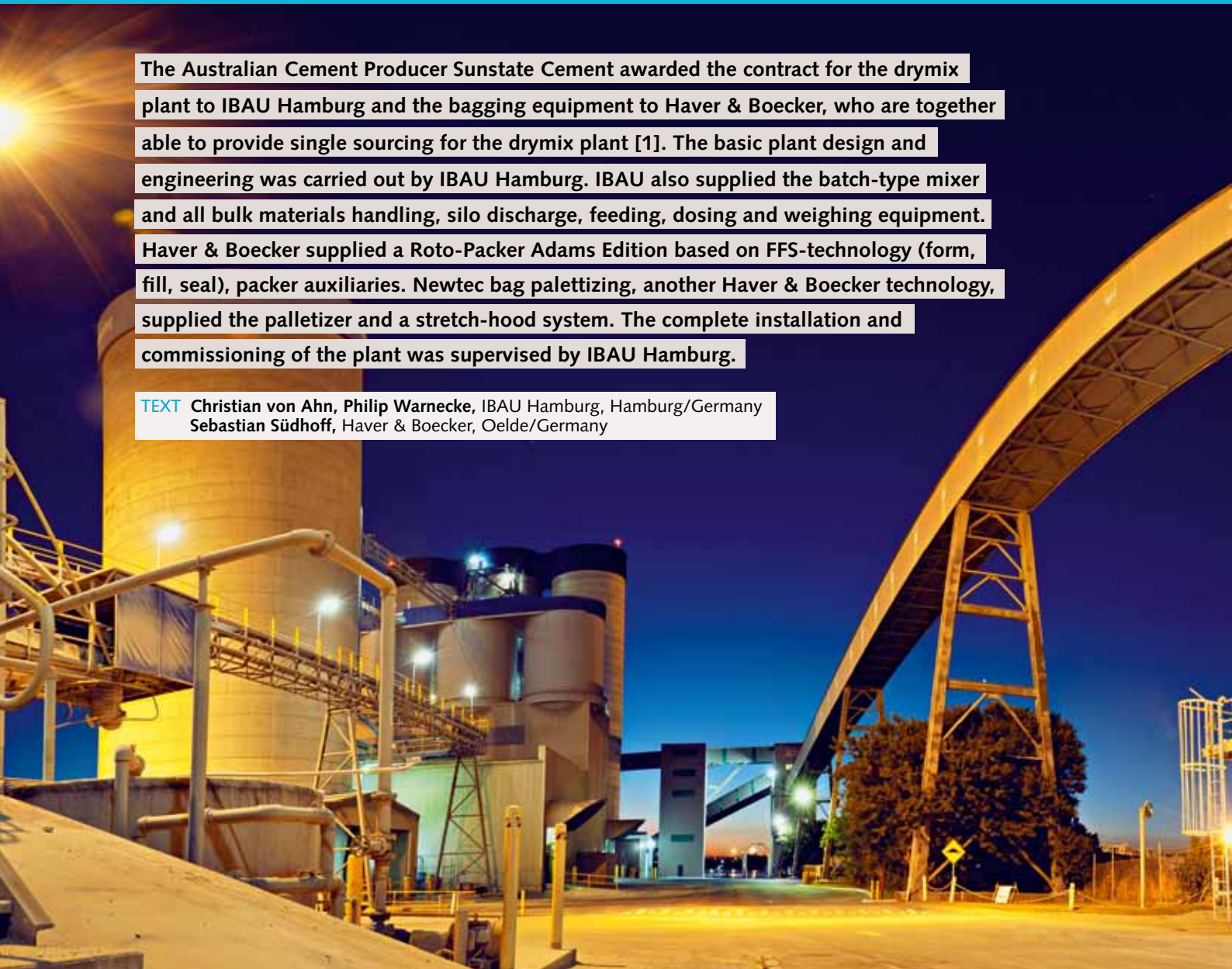


The Australian Cement Producer Sunstate Cement awarded the contract for the drymix plant to IBAU Hamburg and the bagging equipment to Haver & Boecker, who are together able to provide single sourcing for the drymix plant [1]. The basic plant design and engineering was carried out by IBAU Hamburg. IBAU also supplied the batch-type mixer and all bulk materials handling, silo discharge, feeding, dosing and weighing equipment. Haver & Boecker supplied a Roto-Packer Adams Edition based on FFS-technology (form, fill, seal), packer auxiliaries. Newtec bag palettizing, another Haver & Boecker technology, supplied the palletizer and a stretch-hood system. The complete installation and commissioning of the plant was supervised by IBAU Hamburg.

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Sunstate Cement plant in Port of Brisbane

IBAU HAMBURG | HAVER & BOECKER

## Latest drymix plant concept and technology

### 1 Introduction

Sunstate Cement Ltd. is one of Australia's leading producers and suppliers of high quality cementitious products. With a capacity to supply more than 1.5 million t of cement per year it is a contributor to some of the largest and most impressive infrastructure projects in Queensland, West Australia

and northern New South Wales. The company is jointly owned by two of Australia's largest cement manufacturers, Adelaide Brighton Cement Ltd. and Boral Cement (a division of Boral Limited).

Sunstate operates a cement production and distribution terminal (Lead picture) at the Port of Brisbane. Cement and additives mainly arrive by



All IBAU Hamburg/Haver &amp; Boecker

ship and are unloaded at the terminal's own berth. The company, who produces a large range of bulk and bagged cement products, including blended slag and fly ash cements, decided to complement its product range by introducing a number of ready to use drymix products. At the same time, Sunstate Cement wanted to offer its clients the advantages to store these products outside and to optimize logistic expenses.

Therefore, Sunstate Cement awarded IBAU Hamburg and Haver & Boecker the contract to supply the main components, design and commission of their new drymix production plant. After starting off with the technical discussion and consulting in November 2015 and the contract award in January 2016, the fabrication, acceptance and testing

were carried out in July, followed by the plant installation which began in October and ended with the successful commissioning in November 2016. In comparison to similar plants with an average time of two years from order to operation, the complete project was realized in fourteen months.

## 2 Sunstate Cement and their major requirements

With the uptrend in the Australia's Do-it-Yourself markets Sunstate Cement decided on a new and state-of-the-art drymix production facility. The main proposed products were a high-performance concrete mix, a special mortar mix blend, a special post mix, a rapid set mix as well as a paver sand mix. These products, which are designed to be ready to use, have proportionately different blends of ingredients, including cement, lime, gravel, sand and additives. The company decided to shift from the more traditional paper packaging to plastic bags (PE) and this was done for a number of reasons:

- » PE bags are dust-free, waterproof and UV resistant
- » PE bags allow for high-quality, eye-catching and colourful printing
- » PE bags have no spillage during transport
- » PE bags can be stored outside, all year long
- » PE bags are tear-resistant and flexible

Accordingly, Sunstate's drymix products in PE bags increase the company's own storage capacity and those of the clients, reduce overall logistics expenses and offer an essential advantage at the point of sale. Sunstate Cement decided on PE bags of 10, 20 and 30 kg, to be palletized and equipped with a stretch-hood system for maximum load integrity.

The technical requirements were complex. The new facility had to be installed taking into account storage silos, a bag filter and the building that already existed. The major equipment including the mechanical mixer, packer and palletizer were to be delivered from a single source as was all auxiliary equipment such as the silo extraction, material transports, feeding/dosing and weighing systems, all packer and palletizer auxiliaries, the stretch-hood system as well as plant automation and control. The new plant's requirement was to be easily expandable to future market demands. However, the footprint of the plant was very limited. The main requirements were:

- » small footprint of the plant,
- » state-of-the-art technology
- » integration of new silos and existing buildings
- » easy possibility for expansion
- » short delivery time
- » customer support



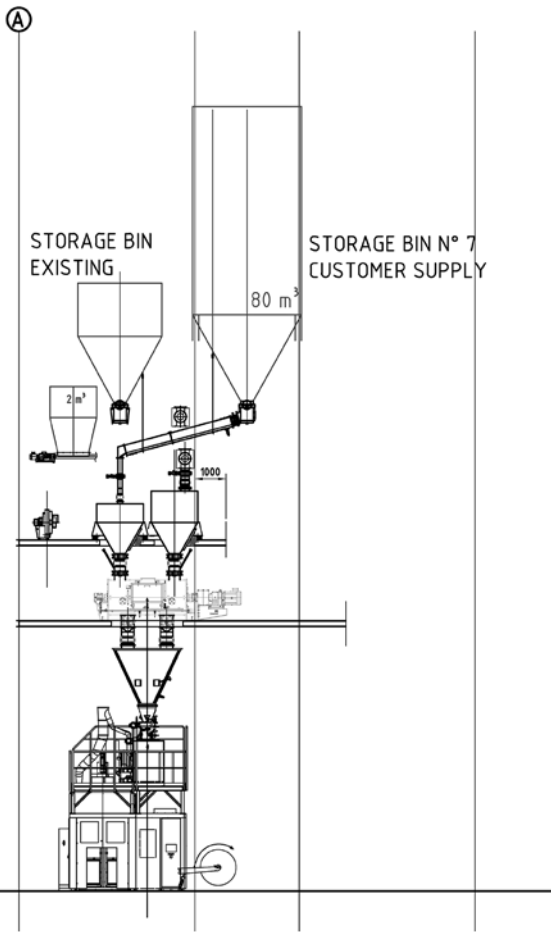
1 Drymix building with storage silos

3 Drymix plant design and major components

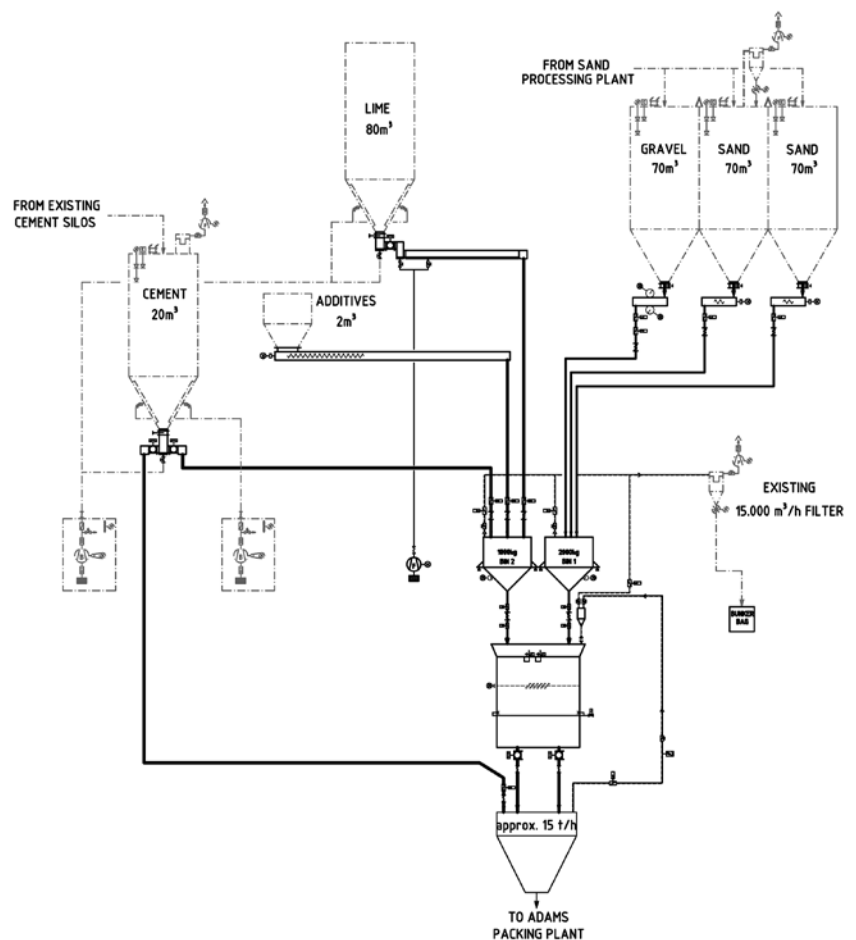
Figure 1 shows the building of the new drymix plant with the storage silos. The larger silos are for the storage of cement and blended cements, which is part of the cement production plant. In total the dry-

mix plant has five storage silos, one for cement, one for lime/flyash, one for gravel and two for sands. The storage capacity of the individual silos range from 20 to 100 m<sup>3</sup>. Furthermore, the plant has one bin for additives. Figure 2 shows the layout of the plant. The mixing tower only has a height of about 25 m. Sunstate's building is very compact - integrating the mixing plant, packing plant, palletizer and stretch hood system. No dryer and separation equipment was necessary for the sand and gravel, because these products were all delivered separately.

Figure 3 illustrates the flow sheet of the mixing plant. The key component is the IBAU Batch-type mixer IBAU M 2500 (Figure 4), which has a 45 kW drive. The mixer has a gross volume of 2.5 m<sup>3</sup> and allows, with 12 mixing cycles per hour, a guaranteed throughput of 15 t/h. With discontinuous mixing a very large quantity of recipes is possible [2]. Sunstate has the ability to produce special drymix or cement recipes according to individual customer requirements. The mixing cycle of a batch-type mixer consists of the filling time, mixing time and discharge time. During the mixing process the next batch is prepared.



2 Drymix plant layout



3 Flow-sheet of the mixing plant





4 IBAU Mechanical mixer

The mixing plant has two weighing bins: the larger one with 2000 kg weighing range and 2.6 m<sup>3</sup> gross volume is for sand and gravel, the smaller one with 1000 kg weighing range and 1.6 m<sup>3</sup> gross volume is for cement, lime and additives. The feeding and dosing of the material to the weighing bins is done either by fluidslides, screw feeders or vibrating feeders (Figure 5). State-of-the-art micro-processor-controlled electronics are used for automated weighing, dosing and mixing. The quality of all production batches can be monitored and documented. From the mixer the finished products are transported directly to the packing plant. No intermediate storage of finished products is necessary.

The heart of the packing and palletising plant is the Roto-Packer Adams Edition (Figure 6). The packer is equipped with two filling modules for a capacity of 600 bags/hour, but can easily be upgraded to four filling spouts with 1200 bags/hour. The FFS technology (form, fill, seal) is the latest high-performance packing technology for powdery products [3]. The bags are formed in the packing machine from a continuous PE plastic tube. Then the formed bag is filled on one of the filling modules, compacted during filling and hermetically sealed via pulse-welding technology.

Each filling module is equipped with the MEC electronic weighing system with touch panel and leading weight accuracy, which have made Haver & Boecker the well-known specialist for bagging systems. Anyhow, for maximum customer safety the bag discharge line is equipped with a bag flattening device, checkweigher and bag rejecting system, in case bags with under- or overweight



5 Dosing and feeding equipment

should be detected. The complete system is designed for PE bags with 10 kg, 20 kg and 30 kg weights and can easily be adapted to bigger and smaller bag sizes. Haver & Boecker has also supported the customer in the bag size calculation, so that with this “start-up” right from the start all the bags can be sold.

The bagging plant comprises a Newtec Batipal S1200 palletizer for a bag capacity of 1200 bags and a Lachenmeier T1 stretch-hood system. The automatic bag palletizer (Figure 7) is characterized by reliable operation and layer stacking which ensures an excellent palletising quality. Based on the principle of simple sequential actions, the Batipal allows all required different patterns and bags of

6 Haver & Boecker  
Adams4 rotary packer





7 Newtec bag palletizer



8 Bagging spout in filling position



9 Bag transfer to the conveying line

various weights and dimensions. The stretch-hood system completes the bagging line. The stretch hood is made from a continuous transparent film which is stretched over the pallet for load integrity. The machine automatically adjusts to the pallet height and allows easy maintenance.

#### 4 Latest PE packing technology

One of the plant's highlights is definitely the PE packing technology. Sunstate Cement recognized from Haver & Boecker's other references in the building material industry the benefits of using PE bags not just for themselves but also for their customers. Retailers and wholesalers can increase their stock level as additional undercover storage is not required, while construction companies can leave their bags outside in the open on work-sites, even under harsh weather conditions. The bags are cleaner, waterproof and tear resistant and emit no dust during handling and transportation.

The FFS technology is fully automated and makes bag applicators for the packer unnecessary. The PE tubular film, from which the bags are formed in the bagging machine, are simply supplied from a reel. The bags are formed from a flat film by welding the side seams and bottom seam and then cutting off the produced bag from the plastic film tube. This allows a very compact bag design, which is perfect for storage and also possible with a handle punch. Gripper units accurately transfer the bags to the filling spouts. During filling procedure external and internal bag vibrating units ensure the required de-aeration and compaction of the dry powder products.

The main advantage of this mechanical vibration system (Figure 8) is its high availability and that in contrast to vacuum systems, this micro vibration does not exhaust any fine particles, which could lead to inhomogeneous products. The filled bags are 100% closed – sealed with a low maintenance pulse-welding device. The bags are transferred to this device in their upright position (Figure 9). If required, a head seam cleaning and cooling systems can easily be integrated. The modular configuration of the Haver Adams makes it possible to use between one to ten filling modules. The complete machine is fully enclosed, to fulfill all safety standards like "Lototo" and others.

In another option, remote support of the packer is available with a HPS system (Haver Service Pad). The system consisting of a touchpad (Figure 10), an integrated camera and software, enables operators, service technicians and other service staff to communicate directly with the packer via a high-speed internet connection. This allows short



response times, when issues occur and ensures a higher machine availability.

### 5 Outlook

Sunstate Cement installed a drymix plant concept, which is a state-of-the-art example for other prospective drymix producers around the world. The concept shows, that drymix plants only need a small footprint and can easily be implemented. Drymix producers just need the market know-how and the availability of the raw materials for the drymix products, while the plant can be installed on a turn-key basis, even when sub-sections of the plant such as silos and buildings are existing. The PE bag technology offers even more opportunities to enter markets, because of its many advantages in comparison to conventional bags. Examples prove that some cement producers even completely shift to PE bags.



10 Touchpad for packer

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- [2] von Ahn, C.: Advanced Turnkey Dry Mortar Plants. Presentation at AFCM Conference (ASEAN Federation of Cement Manufactures), 21–24 April 2015, Hanoi/Vietnam