Concrete paving in Australia

Wet-cast production of concrete pavers with a fully automatic plant from BFS

In 2005, the German company BFS delivered and installed a new wet-cast plant for Atlas Paving in Australia. The plant, which is divided into separate lines for wet and dry production sequences, is designed for fully automised manufacture of concrete block and slab paving. To achieve high flexibility in the production process, wet and dry production lines are connected via fork lift traffic.

In many parts of the world, concrete block and slab paving is primarily manufactured using dry-cast technology in connection with immediate stripping of cast elements. In recent years, however, wet-cast technology, which has its roots in England, has seen a significant increase in market share in many regions worldwide. Following increasing demand for high-quality concrete block and slab paving, Atlas Paving in Perth, Australia, decided to expand their production facilities by a modern, fully automised plant in 2005. After extensive market research, the company decided to use wet-cast technology and assigned the German-based company BFS Precast Systems for delivery and installation of the new equipment. BFS operates branches in Europe, South and North America, and Asia and offers a comprehensive range of machinery for the production of concrete blocks and paving slabs and concrete elements for water supply and waste water management.

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The plant, which is divided into separate lines for wet and dry production sequences, is designed for fully automised manufacture of concrete block and slab paving

In the following, logistic and layout of the new plant will be discussed based on description of a full production cycle. Empty paletts are automatically transported to the entry buffer and placed into the destacker. Paletts may be made of timber, steel or plastic and can receive between 1 and 6 moulds, depending of the size of the elements. Standard elements of Atlas Paving are concrete slabs with a size of 300 x 300 mm, corresponding to 6 moulds per palett. With a production sequence of 15 seconds, up to 24 elements can be made per minute. The new production plant was equipped with moulds supplied by Via Domo / Rampf (**Figure 2**).

2

Depending on the size of the elements, paletts receive up to 6 moulds

A production sequence of 15 seconds guarantees efficiency

Individual palettes are automatically removed from the destacker and transported via a control station to the cleaning station where the whole palett is tilted to remove concrete scrap, dust, and other loose particles from the moulds. The cleaning is solely done by the influence of gravity, no washing or sucking devices have to be used. In the oiling station, which BFS developed especially for this type of production plant, all moulds are automatically and evenly sprayed with mould release oil. The oiling station is designed to provide the exact quantity of oil to bottom and sides of the moulds, using specially developed spray pistols. All types of moulds, independent of size or shape, can be treated with the set-up without having to change the spray pistols. The readily oiled moulds are now transported via another control station to the feeding unit, were they are filled with fresh concrete.

Colouring is controlled via 2 separate concrete feeding units

The mixing plant consists of 2 separate mixers with capacities of 500 l each. Pigments are mixed into the concrete mixes according to specifications. The final concrete mix is combined from two differently coloured mixes, using exact proportions according to colour specifications of the product. For this, the 2 different mixes are placed into different feeding units and transported to a specially designed colour-mixing apparatus. Once the final mix is prepared it is fed into the distribution boxes (**Figure 3**). For this production step it is of great importance that there is always sufficient concrete to fill the distribution boxes. The filling of the moulds is done via a number of separate proportioning containers. The filling volume of the containers can be adjusted, which can be controlled manually or automatically. Depending on the situation, the proportioning containers can be used with different sequences.

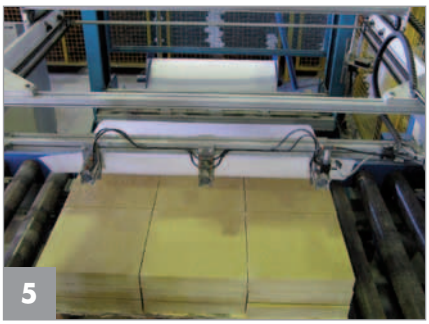
The final concrete mix is combined from two differently coloured mixes, using exact proportions according to colour specifications of the product

Following the filling of the moulds, the Paletts are transported to the vibrating tables. Since the production sequence of 15 second is not sufficient to compact the concrete thoroughly, the paletts are passed through 2 vibration tables, which are positioned after each other, to guarantee optimum compaction. The paletts are now transported via a control station to the stacker, where they are pushed into the bottom of the stack and lifted upwards on arrival of the next palett. With about 15 paletts one stack is complete but the number of paletts per stack can be varied according to the situation. The completed stacks of paletts are picked up at the exit buffer by fork lifts and transported to the curing area. Atlas operates 2 fork lifts for this purpose. The curing area is big enough to accommodate all pallets produced during one working day. The concrete members are cured without special treatment and simply left to air-dry in their moulds.

The complete production cycle of the plant is controlled by 2 workers only

Once curing has been completed the paletts are transported with fork lifts to the entry buffer of the demoulding plant. The destacker removes the paletts individually from the stack and transports them to the stripping station. One worker controls the product quality at the destacker to ensure that the concrete members meet the requirements. Stripping of moulds is done automatically and all moulds of a palett are stripped at the same time (**Figure 4**). Empty moulds are transported via an automatic conveyor system back to the entry buffer of the wet-line where the whole production cycle starts again.

Stripping of the moulds is done automatically and all moulds of a palett are stripped at the same time



A protection foil is placed between the surfaces of the pavers

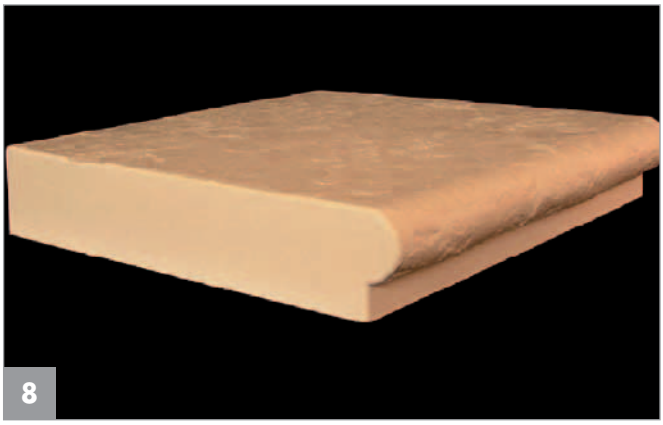
The stripped concrete members are transported to the turning station where they are stacked on paletts, every second layer of concrete members being placed face down onto the face of the previous layer. A protection foil is placed between the faces of the members to ensure high quality concrete surfaces. This is done with specially designed equipment (**Figure 5**). The delivery paletts are filled with approximately 8 – 10 layers of products and subsequently strapped with 10 mm thick straps at the strapping station. In the fully automatic thermo shrinking station, plastic sheets are pulled over the whole paletts and shrunk. The paletts are now ready for delivery and transported via a conveyor belt to the storage plant (**Figure 6**).

High quality Polyurethane moulds guarantee first class surface textures

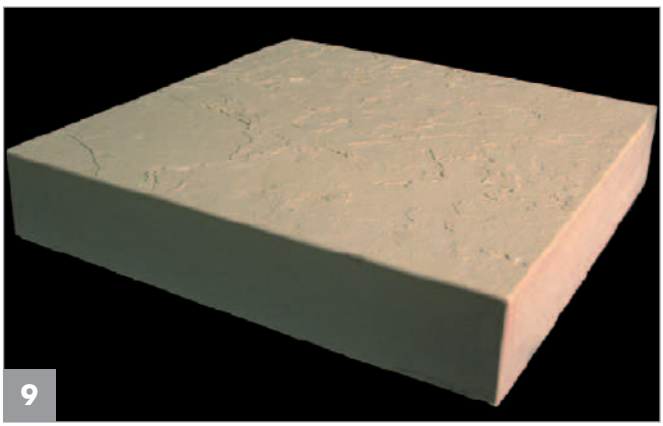
Atlas Paving is one of the leading manufacturers of trendy products with modern design. The concrete pavers produced with the new plant receive a high quality reconstituted Limestone finish. For this surface texture, Atlas appointed Via Domo GmbH, part of the company Rampf Formen, to develop a concrete paver system with Limestone finish and manufacture the respective Polyurethane moulds. The Limestone texture in the mould surfaces was formed as a negative from original rocks taken from the German mountain range Schwäbische Alb. **Figures 7** to **9** show this classic and beautiful paving, which cannot be distinguished from a natural floor. The elements are dimensioned with very tight tolerances, which is why the moulds had to be

The completed delivery paletts are transported via a conveyor belt to the storage plant

Joint detail of the pavers



Bullnose of the pavers



Standard paving slab with dimensions of 350 x 350 x 60 mm

Double-mould for half-sized elements

Standard mould, made from high quality, dimensionally stable Polyurethane

manufactured of a dimensionally very stable Polyurethane material. The tight joints between the pavers demand constant and exact element dimensions. A Polyurethane material, which was originally developed for sealing technology in mechanical engineering, meets these requirements (**Figures 10, 11**). High mechanical strength in connection with very little water sorption are the key to the success of the moulds.

Atlas Paving – leading concrete paving producer in Western Australia

Atlas Group started 1954 with the production of lime silica bricks and expanded their product range 1991 by concrete pavers manufactured with dry-cast technology. The new BFS production plant was commissioned in 2005. In view of increasing demand for high quality concrete pavers in and around Perth, this investment will surely pay off. The product range of the company includes various concrete block and slab pavers, which can be supplied in a range of different colours. In addition to the typical brick shape pavers (230 x 115 x 50 (or 60) mm) and interlocking pavers, square slabs with dimensions between 190 x 190 and 300 x 300 mm are produced in thickness of 50 or 60 mm. For paver production, Atlas has a total of 53 employees in their only factory. The production area spreads for about 100 ha, 35 ha of which are covered with a roof, and includes storage capacity for 4,000 t of aggregate and silos for 350 t of cement. Monthly production of concrete pavers is approximately 8,600 t. In addition to the new wet-cast plant, Atlas is considering to purchase another press for the production of concrete pavers with dry-cast technology in order to keep up with the demand.

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