

SR Schindler, 93057 Regensburg, Germany

# Extensive finishing plant for Austral Masonry in Australia

Austral Masonry belongs to the publicly traded company Brickworks Ltd. with headquarters in Sydney Horsley Park. Brickworks, founded in 1934, is Australia's biggest brick producer with the subdivisions Building Products Australia and Building Products North America. Building Products Australia is again divided into Austral Masonry, Austral Bricks, Austral Precast, and Bristle Roofing. After long technical discussions and several layout proposals from Hess and SR Schindler, Austral Masonry placed an order with Hess, respectively SR Schindler, in the middle of 2019. Subjects of the individual agreements were the delivery, assembly, and commissioning of a stone-making Hess Multimat RH 2000-4 MVA with corresponding handling technology and a packaging line for grey products, respectively, of a finishing plant with packaging lines for value-added products.

The complete plant was to be installed in the new hall to be built. The biggest challenge was the customer's request for an Allen Bradley control, the Brickworks Electrical Standards, and the observance of the Australian Standards. As per the contract, the deadline for commissioning was fixed for the middle of 2020. Due to the Corona pandemic, however, this date could not be kept, and thus the end of commissioning/start of production was delayed until autumn 2022.

The SR Schindler finishing plant consists of the following groups:

1. Take-over of cured products directly from the Hess dry side 2, respectively, from external infeed and feeding of products to the individual finishing lines
2. Finishing line shotblasting - curling - coating
3. Finishing line splitting
4. Packaging lines
5. Empty pallet transport
6. Allen Bradley control

The complete line is executed for max. layer size 1.200 x 1.200 mm. The product thickness range in the shotblasting - curling - coating line is limited to 35-400 mm; 35-550 mm high processing is possible in the splitting line.

Thanks to the elaborated plant configuration, the following processes are possible:

- Infeed of product layers from Hess latch conveyor on the dry side 2 to the shotblasting-curling-coating line and subsequent packaging
- External infeed of paving stone layers to the shotblasting-curling-coating line and subsequent packaging



General view of the new value-adding at Austral Masonry

- Infeed of paving stone layers from Hess dry side 2 to the calibrating-grinding line provided by Austral with further processing in the shotblasting-curling-coating line and subsequent packaging. As an option, the upper edges of the products can be chamfered in the bevelling bypass.
  - External infeed of paving stone layers to the calibrating-grinding line provided by Austral with further processing in the shotblasting-curling-coating line and subsequent packaging. As an option, the upper edges of the products can be chamfered in the bevelling bypass.
  - Infeed of wall stones from Hess latch conveyor on the dry side 2 to the shotblasting-curling-coating line and subsequent packaging. Before starting the finishing process, the wall stones have to be tilted by 90° so that the side to be treated looks upwards. After finishing the wall stones get retilted again by 90° and then packed. As an option, the upper edges of the wall stones can be chamfered in the bevelling bypass before the value-adding process in the shotblasting-curling-coating line starts.
  - External infeed of wall stones to the shotblasting-curling-coating line and subsequent packaging. Before starting the finishing process, the wall stones have to be tilted by 90° so that the side to be treated looks upwards. After having been finished, the wall stones get retilted again by 90° and get then packed. As an option, the upper edges of the wall stones can be chamfered in
- the bevelling bypass before the value-adding process in the shotblasting-curling-coating line starts.
  - Infeed of wall stones from Hess latch conveyor on the dry side 2 to the calibrating-grinding line provided by Austral with further processing in the shotblasting-curling-coating line and subsequent 90° tilting and packaging. As an option, the upper edges of the wall stones can be chamfered in the bevelling bypass before the value-adding process in the shotblasting-curling-coating line starts.
  - External infeed of wall stones to the calibrating-grinding line provided by Austral with further processing in the shotblasting-curling-coating line and subsequent 90° tilting and packaging. As an option, the upper edges of the wall stones can be chamfered in the bevelling bypass before the value-adding process in the shotblasting-curling-coating line starts.
  - Infeed of block stones, wall, and hollow block stones from Hess dry side 2 to the splitting line and subsequent packaging.
  - External infeed of block stones, wall, and hollow block stones to the splitting line and subsequent packaging. External infeed is possible at 2 positions.
  - Infeed of paving stone layers from Hess latch conveyor on the dry side 2 to the calibrating-grinding line provided by Austral and passage through the splitting line (without treatment) and subsequent packaging. In this



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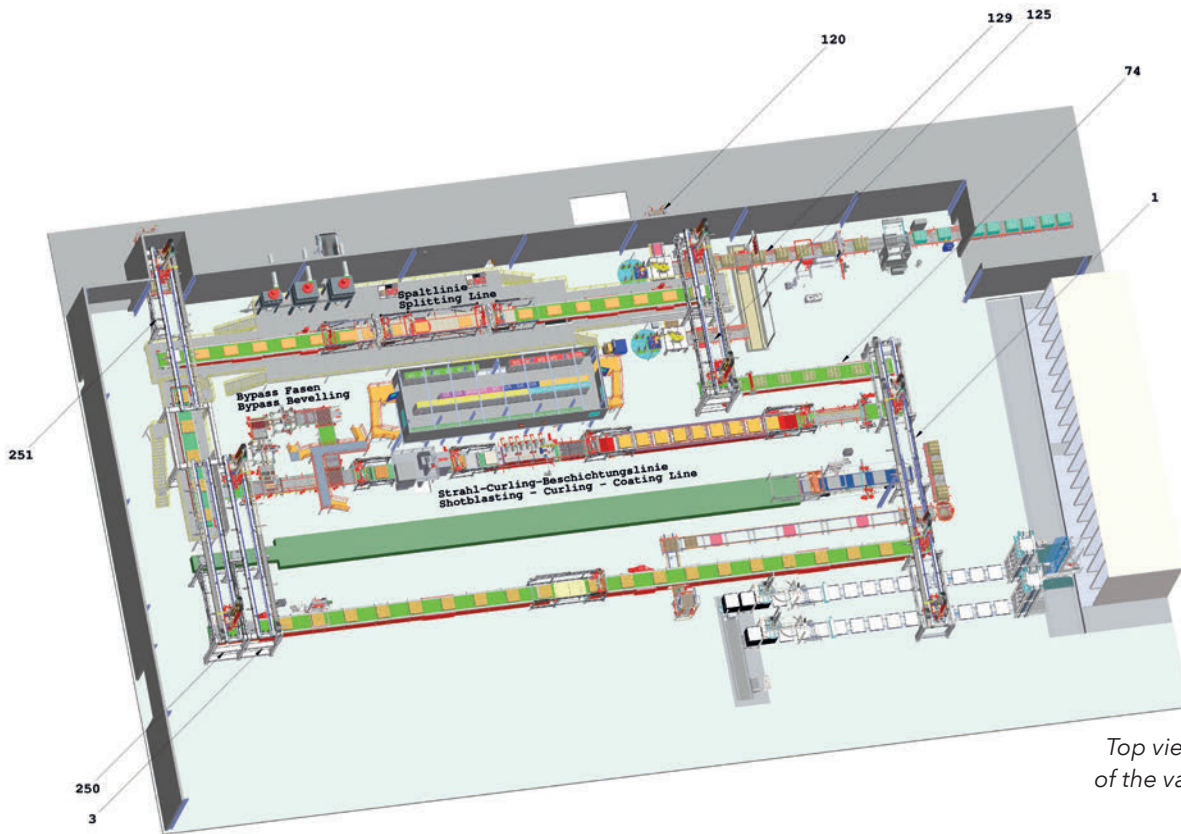
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Top view layout drawing of the value-adding plant

case, the products are not treated in the shotblasting-curling-coating line.

- External infeed of paving stone layers to the calibrating - grinding line provided by Austral and passage through the splitting line (without treatment) and subsequent packaging. In this case, the products are not treated in the shotblasting-curling-coating line.

Related to the infeed and transport mode and the finishing to be applied, the cycle time varies between 20-40 secs. per layer. Because the plant has two packaging lines, several processes listed above can be performed simultaneously.

### Infeed of products to the finishing lines

The infeed of products from Hess dry side 2 or the external infeed is done by 4 cubers with 1 - 3 travelling trolleys driven by servo motors and equipped with 4-sided clamps and servomotor driven. Every clamp can be additionally equipped with a vacuum suction plate for safe grabbing and transport of products with product thickness < 50 mm.

Cuber pos. 1 collect all product layers either from the Hess latch conveyor on the dry side 2 or from external infeed fed directly to the calibrating - grinding line provided by Austral



Cuber pos. 3 and pos. 250

or transported by a belt conveyor approx. 68 m long to cuber pos. 3, respectively 250.

Cuber pos. 3 picks up the product layers either at the exit of the calibrating - grinding line or at the end of the belt conveyor and transfers the layers to the shotblasting -curling - coating line. A bevelling line in bypass as an upstream equipment chamfers ground products optionally before being shotblasted/curled/coated. Austral provided a filter device that takes care of dust disposal/extraction. If wall stones are to be processed in the shotblasting - curling - coating line, a tilting device cares for the correct positioning of the products (the side to be treated is showing upwards then).

Cuber pos. 250 picks up the product layers at the exit of the calibrating-grinding line or at the end of the belt conveyor and puts them on a further belt conveyor, which transports them to the cuber pos. 251. This cuber places the layers at the infeed of the splitting line. Also, layers from external infeed to be split get transferred from this cuber to the splitting line. Ground products pass the splitting line without further treatment to get to the packing line.

Cubers pos.3, 250, and 251 and the splitting line are executed in excess height for safe forklift passage, respectively, so waste belts and empty pallet transport can be assembled above ground.

### Finishing Line Shotblasting - Curling - Coating

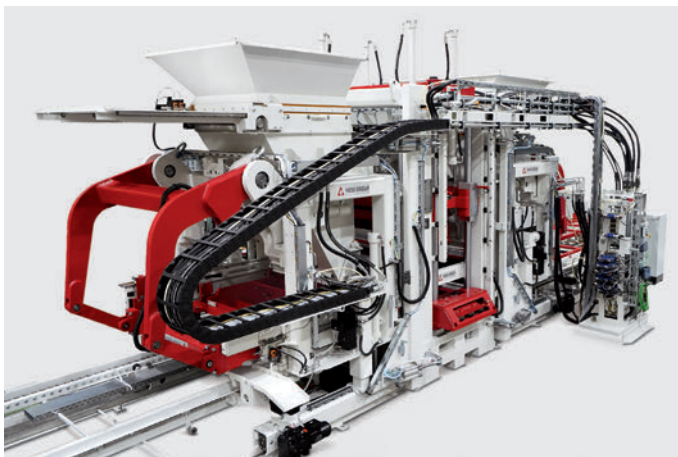
The infeed of product layers gets done by a roller conveyor system and a layer pusher which pushes the layers layer-wise in the shotblaster. Additional horizontal strapping devices provided by the customer at the infeed of the calibrating-grinding line and at the end of the 68 m long belt conveyor care for the stability of layers during transport and the stability of wall stone layers upon treatment of the head side of the products.

During shotblasting, fine cement particles are removed from the surface of the concrete products, thus partially exposing stylistic aggregate, such as granite inclusions. Shotblasted surfaces are characterized by high visual and tactile quality and slip resistance.

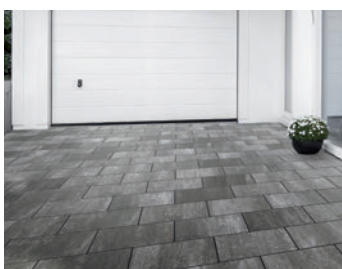
In the shotblasting machine, steel or stainless steel balls with a diameter of 0.6-0.8 mm are hurled onto the product surfaces by special turbines. The products that need to be shotblasted are placed on a perforated conveyor belt during processing and are cleaned after the shotblasting process with the help of a blow-off station. The abrasive falls through the perforated belt, gets collected, cleaned, and fed back into the process. A filter device extracts any dust generated during processing. The shotblaster is equipped additionally with automatic adjustment of guiding sleeves and automatic height adjustment of turbines.



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At the output of the shotblast machine, the individual layers are assembled using a layer pusher with a transfer table and pneumatic lateral clamping into a continuous row and further processed in the following curling machine.

The curling process removes any excess cement from the product surface. The grain in the surface is polished by the electrically height-adjustable and frequency-controlled curling brushes rotating around the horizontal axis. Curling is particularly suitable for structured surfaces because the structure is retained, and the flexible bristles allow processing in deeper areas. Curling is a recommendable upstream process step for products that need to be coated because it removes the residual dust on the surface using blowing nozzles for cleaning.

The curling machine is equipped with three processing tunnels, each with two brush rollers. The brushes, which are arranged at an angle of several degrees, rotate alternately in opposite directions, thus avoiding line marks on the product surface. A separate filter system ensures virtually dust-free air in the hall.

Using a subsequent accumulation roller conveyor, the endless row gets resolved, and visual quality control takes place. The operator removes defective products and replaces them with products without fault. A stopper system integrated into the accumulation roller conveyor separates the endless row in layers. A layer pusher with pneumatic lateral clamping transports the individual layers onto a special conveyor equipped with Hardox plates and revolving pushing bars for layerwise transport. The conveyor is self-cleaning.

Above the special conveyor, an electromotively height-adjustable Infrared preheating tunnel is mounted. Depending on the chemicals used, it heats the products to be coated to approx. 30° C and thus ensures better adhesion of the primer. Subsequently, a spraying module for the application of primer, an Infrared tunnel for drying primed products, a spraying module for the application of sealer, and an Infrared tunnel for drying the sealed products are arranged linearly behind each other. The heating tunnels are identically

executed. The spraying modules are meant for solvent-free chemical agents. A suction device removes the atomized spray.

The layers get transported onto a feeding system by a subsequent layer pusher with pneumatic lateral clamping. For wall stones, there is a further 90° tilting device installed. Finally, the layers run on a belt conveyor to the pick up position where the cuber pos. 1 transfers them on a further belt conveyor, which transports them to the cuber pos. 125 of the packaging lines.

### Finishing line splitting

An approx. 26 m long belt conveyor and a layer pusher with a measuring system transport the layers to the splitting line.

The splitting line consists of two identical splitters, Split 1200 executed for max. working width 1.200 mm. Products 50 -550 mm can be processed. In the splitting machine, the upper and lower splitting knives work like pincers. This means both knives are continuously pulled together by full force balance until the splitting happens. Due to this type of split, better splitting results are achieved compared to the normal splitting process.

The inner double frame's upper and lower knife-holding devices are moveable. The main split cylinder is also fixed at the inner double frame's traverse bar. Selectable hydraulic side knives support the splitting process for high products. As the product will be split simultaneously at four sides, the splitting quality increases visibly. The moveable upper knife in the main cylinder can adapt to varying product heights. The hydraulic system consists of a controllable hydraulic pump and an oil cooler to protect the hydraulic oil from overheating.

After 1st split, a double-layer pusher with a waste flap and the rotating table are installed. The first layer pusher picks up the transverse-split products and conveys them to a rotating table. This rotates the products by 90° so that longitudinal splitting can take place in the second splitting machine.



Top view of cuber pos. 251 with belt conveyor for infeed to splitting line



*The splitting line in operation*

The second layer pusher takes the products from the rotating table, transfers them to a further layer pusher equipped with a measuring system, and feeds the products to the second splitting machine Split 1200.

The realized design with two splitting machines arranged one after the other and the 90° rotating table in between allows longitudinal and transverse splitting of the products in a linear and automated sequence.

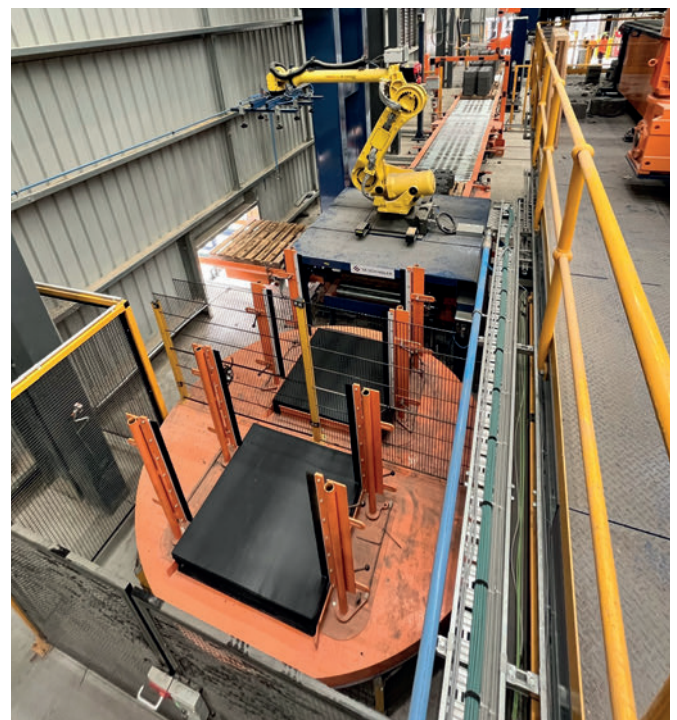
After longitudinal splitting, the products are transported further using the following layer pusher. The second waste flap is also installed here. The splitting residues are fed to a waste belt system through the waste flaps. This waste belt system picks up all the splitting residues and transports them to a waste container.

After splitting, a belt conveyor transfers the products to the pick-up position by cuber pos. 125.

### Packaging Lines

Cuber pos. 125 equipped with 2 travelling trolleys with electromotive 4-sided clamp and retrofit vacuum suction plate each takes the layers from belt conveyor pos. 74 or from the splitting line and transfer them to the packaging line. Layers picked-up from belt conveyor pos. 74 get laid on transport pallets provided by the chain conveyor. A 6-axis robot puts a protecting styrofoam plate or wood strip between every layer. Styrofoam plates or wood strips are stored in 2 magazines mounted on a rotating table. For refilling the individual magazine, the table rotates by 180° and is thus outside of the safety area. The magazine can then be filled without any risk. The transport pallet with layers runs on a heavy load roller conveyor to a carriage with a roller table. The carriage with roller table is a segment of heavy roller conveyor pos. 129

and moves then back into the home position. From here, the loaded transport pallet continues the ride through horizontal and vertical strapping, the labeling machine, and the hood stretching device. The completed pack runs on the heavy load conveyor to the outdoor area, where a forklift picks it up. Layers from the splitting line get deposited by the 2nd travelling trolley of cuber pos. 125 on a transport pallet provided by a chain conveyor. A second identical 6-axis robot inserts styrofoam plates or wood strips between the layers of ground products. Nothing will be inserted with split product layers.



*Robot with rotating table with magazines*



Top view of the value-adding line featuring pedestal for switch boards

The loaded transport pallet gets transported also by heavy load roller conveyor pos. 129 through horizontal and vertical strapping, the labeling machine and the hood stretching device get picked up by a forklift outside the hall.

### Empty Pallet Transport

The empty pallets from the external infeed of the splitting line, respectively from the external infeed of calibrating - grinding line, get transported using chain conveyor and roller conveyor systems and then buffered in empty pallet magazines. The pallets necessary for packaging get fed into the packaging line from empty pallet magazine pos. 120.

### Allen Bradley Control

There are 6 Allen-Bradley PLC controls in use for the input, the lines, and the packaging. Machines like shotblasting or curling have their own PLC.

The systems and system parts are connected to each other via Ethernet and can also be reached via remote maintenance. Drives are mainly controlled via SEW Movidrive, Movitrac, and Movimot.

20 control points are available for acknowledging faults in certain areas, starting or stopping the automatic system, and moving to the basic positions.

Six field books from Logic Instruments are integrated into the fieldbus via WLAN for manual operation of the drives and for adjusting and changing settings. A PC is also integrated

into the system for manual control and change or input of settings.

Safety devices such as protective doors, emergency stops, and light curtains are monitored by a safety controller provided by the customer.



Rob Liistro (Chief Engineer at Brickworks Building Products) and Martin M. Dalbert (Managing Director at SR-Schindler) signed off the FAC for the finishing line at the Austral Masonry plant, Sydney, Australia, on 30. 11. 2022.

For maintenance work or repairs, 7 areas are de-energized by 7 repair switches. If one area is de-energized, production can continue in the other areas until the areas come together. 160 drives were installed just for the transport system. More than 1400 inputs and 660 outputs were required to control the system.

The successful completion of the value-adding line at the Austral Masonry plant marks a significant milestone for Brickworks Building Products and SR Schindler. Despite the challenges posed by the pandemic, the two companies have achieved great success through their joint efforts. The installation and commission period were not without obstacles, but they brought the teams together, fostering close and friendly cooperation. Both parties are committed to maintaining a close and trustful partnership.

The project highlights how two companies from different parts of the world overcame the challenges we all faced through constant communication, support & collaboration. "I am very proud & happy with what Martin & his team delivered for Brickworks & through this great collaboration allows Brickworks to continue to make beautiful products that last forever," - says Rob Liistro, Chief Engineer at Brickworks Building Products. ■



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FURTHER INFORMATION



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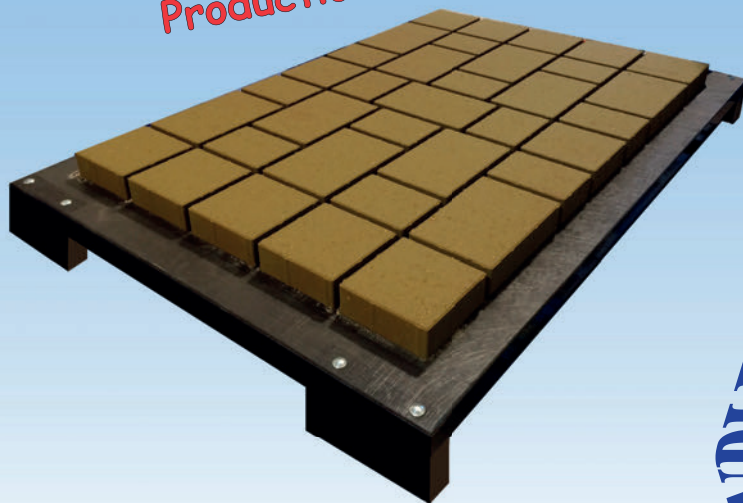


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