

KELLER

intelligent
clay
solutions

ICS



KWASTINA Home of the Brick

A state-of-the-art production
plant for COROBRIK



KWASTINA

A COROBRIK® FACTORY

Prologue



COROBRIK was established in Durban in 1902, from small beginnings. COROBRIK has evolved into the premier South African manufacturer, and distributor of clay bricks, clay pavers and a range of building materials. With factories around South Africa, COROBRIK can distribute more than five million products each day and has a presence in every major centre throughout South Africa.

The facility in Driefontein, near Johannesburg, is one of the largest brick plants in sub-Saharan Africa. It came online at the end of 2021 and represents one of the most modern and energy-efficient brick plants in the world. The planning and realisation were in the hands of KELLER, the shaping was supplied by Rieter Morando. At the new plant, which is called “Kwastina” - (Home of the Brick), 105 million extruded first-class facing bricks are produced per year for the South African market and the market of its neighbouring countries.

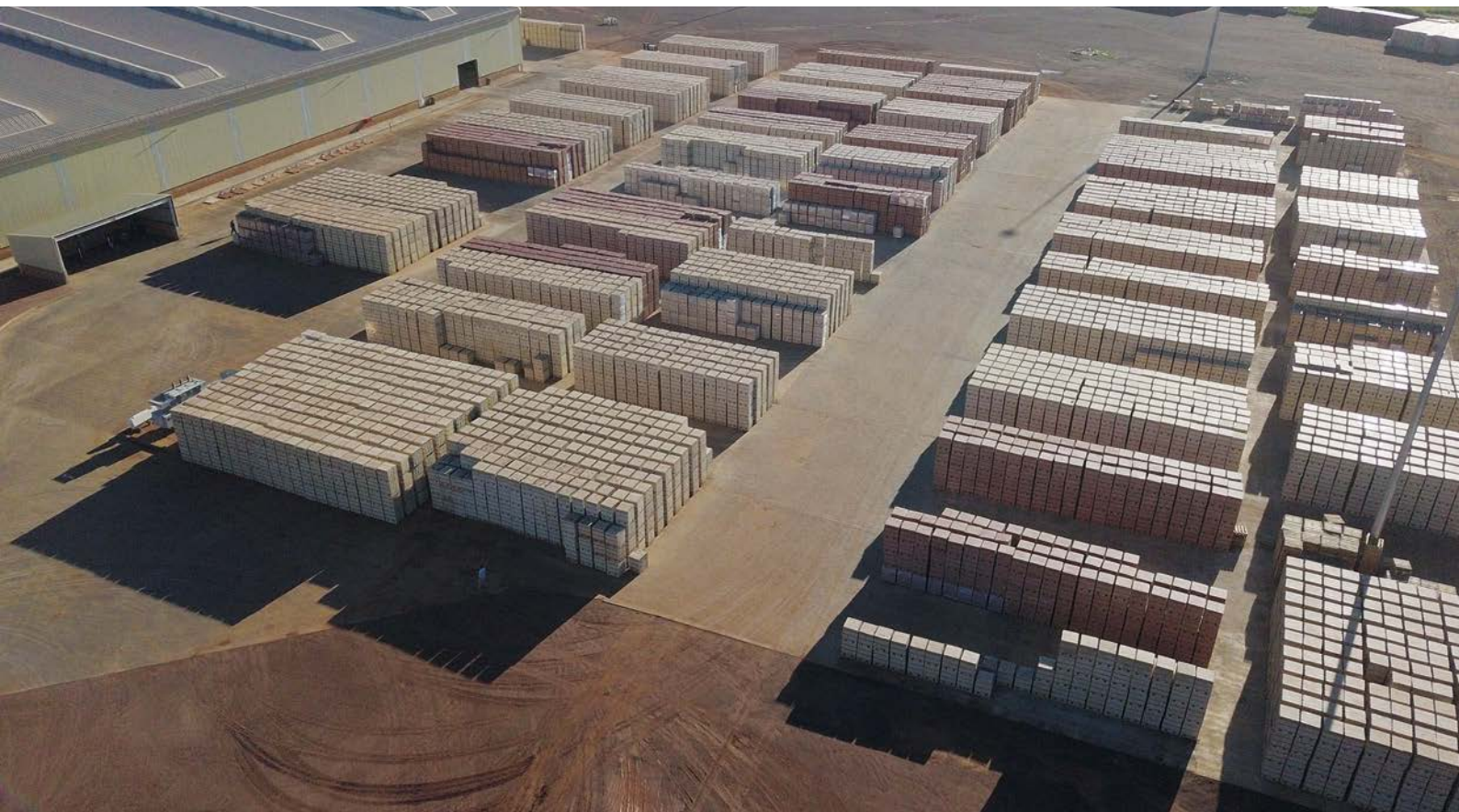
On 4 May 2022, the brick plant was officially opened, in the presence of the President of the Republic of South Africa, His Excellency Mr Matamela Cyril Ramaphosa.



Project

The existing plant at the site has been producing bright-fired bricks very successfully for decades. However, the entire production line was economically and ecologically called into question due to high energy consumption and a high proportion of manual labour.

To be prepared for the future and to set new standards in energy efficiency and automation, COROBRIK assigned KELLER with the realisation of this project. A challenging task for KELLER was the handling of the specific clay material for the production of a large variety of products.



Project data



Working time: _____

50 weeks per year
6.5 days per week
2 shifts per day
10.8 hours per shift (effective)

Reference size: _____

222 mm x 106 mm x 73 mm - 2.3 kg (fired)

Output - reference size: _____

105,000,000 bricks per year

Plant data: _____

Density:	2.2 kg/dm ³
Preparation water content:	22.4 %
Loss on ignition:	10.6 %
Drying time:	40.3 hours
Firing time:	43.0 hours
Firing temperature:	1,120 °C



Production

Following a comprehensive analysis of the existing production plant with regards to an energy-efficient modernisation. A so-called “greenfield project” was constructed close to the existing facility. Along with a new shaping plant, a new fully automatic wet side, and a setting plant for direct setting. In addition, two tunnel dryers followed by two tunnel kilns and a new unloading and packaging plant for dispatch packs without pallets were also added.

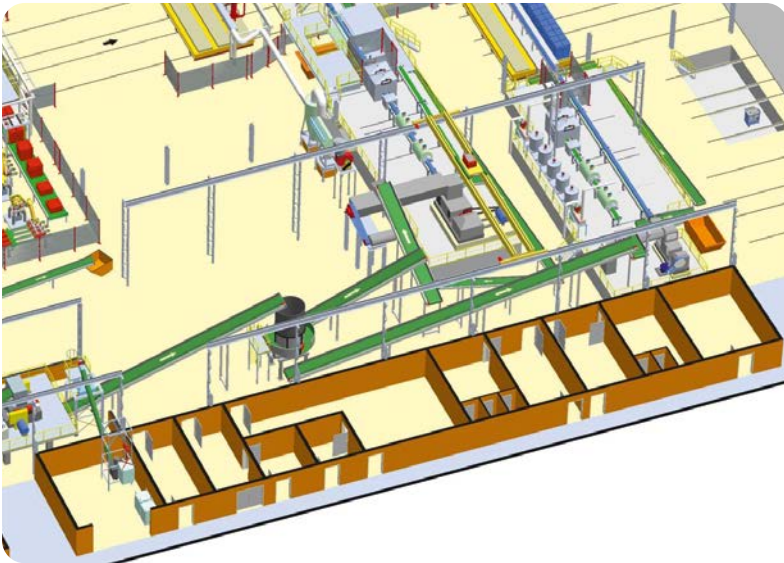


Plant description

Preparation line

The raw material preparation of the existing plant was already sufficiently dimensioned and remained in full operation throughout. The prepared material is transported to the newly installed shaping plant via a new, approx. 270 m long conveyor system.

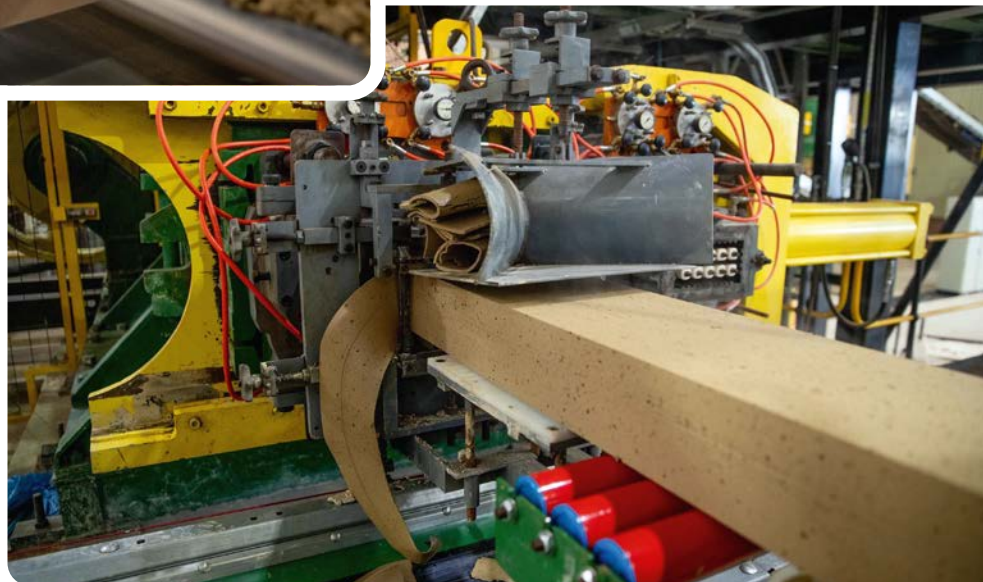




Shaping line

The prepared operating mass is taken up by two box feeders and is prepared for the shaping process with a double-shaft mixer and a Titan-type roller mill.

Mixing water is added via a circular screen feeder. The material is fed to the two extrusion lines to set the final material moisture.



Plant description



Fully automatic wet side

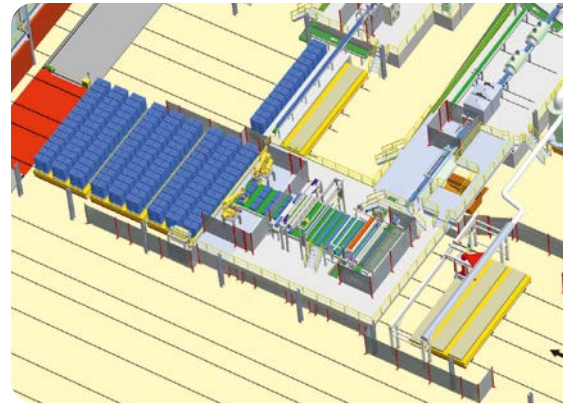
The surface of the extruded clay column can have various processing devices and additives applied to change the optical appearance of the fired brick. For this purpose, the individual processing stations can either be implemented in the production line or “parked” in separate maintenance positions.

A new generation KELLER “lift-through cutter” is installed behind the slug cutter. The pre-cutting rollers for all four brick sides, the modern wire suspension for simple and fast wire changes as well as the optimised drive technology ensure faultless production of the facing bricks.



Setting plant

The bricks are grouped according to the setting pattern and set directly on the tunnel kiln car via two industrial robots in an upright or flat position, single or double in “cross” setting as well as “face to face”.



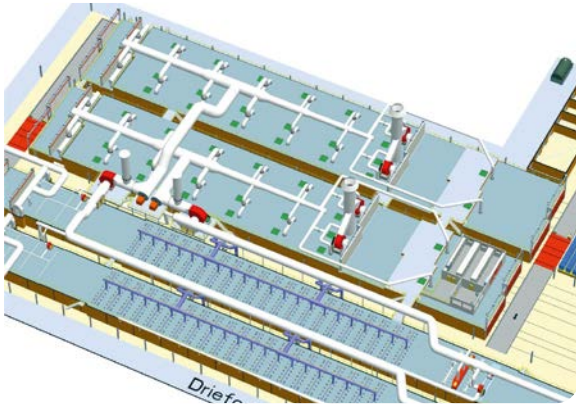
Plant description

Production of special formats

Special formats can be produced on a separate line parallel to the main production and can be manually set on the tunnel kiln car.

The products then pass through the same drying and firing process as the main production. Afterwards, the special products are manually unloaded from the tunnel kiln car and packed.





Dryer plant

The dryer system consists of two separate tunnel dryers based on the well-known drying concept of air circulation. According to the latest technology, the air in the individual zones is circulated by radial fans without housings, which are installed in an intermediate ceiling and operated via external drives.



Adjustable injection openings ensure an optimum drying process. The combination of the drying technology used with the optimised heat compound of the tunnel kilns creates a very efficient, product-friendly, and modern drying system.



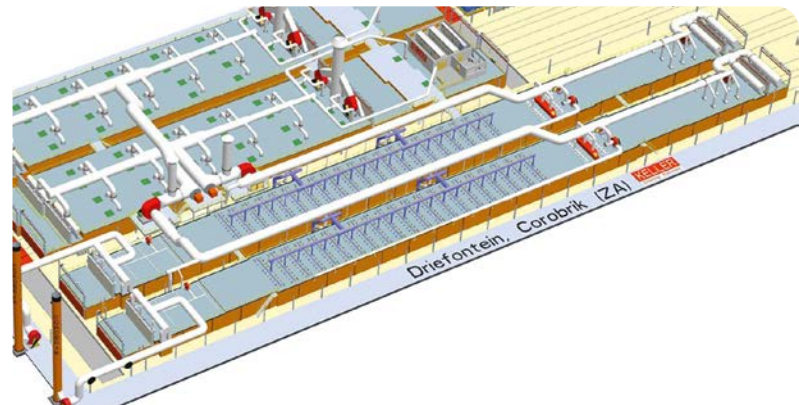
Plant description

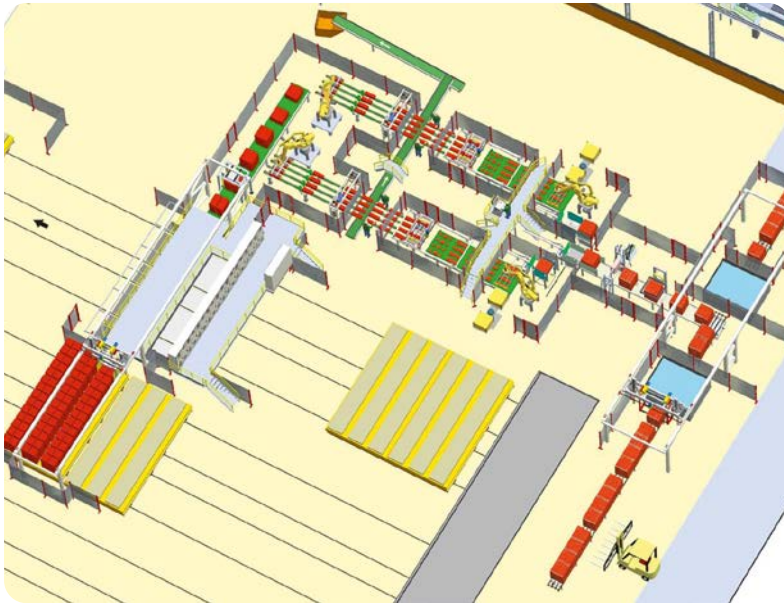


Kiln plant

The kiln system consists of two separate tunnel kilns, which are coated with PTFE material on the inside for sealing. To optimise energy consumption, the kilns are provided with a preheated combustion air supply and systematic wheel cooling in the under-car area.

The burner system with pulse control and flashing device works in combination with the modern KELLER kiln control system. This ensures optimum firing results of the high variation of fired products.





Unloading system

With the fully automatic kiln car handling equipment, the tunnel kiln cars are transported to the unloading position. This is where the complete fired packs are unloaded from the kiln car deck. The packs are placed carefully on a belt conveyor and are then delivered to the dehauling robots. When dehauling layer by layer, each robot spreads the gripped rows and sets them down on the line assigned to it.



Each of the two dehauling lines consists of a toothed belt combination with different modules. This allows the products to be gently grouped into the individual layers of the dispatch pack and to allow quality control inspection.



Plant description



Packaging system

Industrial robots form a complete dispatch pack on each line which is fed to the packaging plant. The dispatch packs are strapped both vertically and horizontally and are provided with the company label COROBRIK.

If requested, the dispatch packs can be immersed in two separately operated immersion basins or placed directly on a magazine conveyor. Following this procedure forklift trucks will transfer the packs to the storage area.





Kiln car cleaning system

The unloaded kiln cars are conveyed to a fully automatic cleaning system to remove any particles.

For an optimum cleaning result, both the bottom draught blocks and the kiln car deck are completely cleaned according to the “top-bottom system”. The bottom draught blocks are then repositioned on the kiln car deck.

Plant description

Control system

All machine and plant components are controlled via a Siemens SIMATIC S7 PLC. The software has been specifically designed and produced by KELLER.

The use of visualization systems increases operational reliability. At the same time, these systems minimize downtime in case of faults.

Another advantage regarding reliability is the worldwide teleservice used in our plants. In case of faults, diagnosis of the reasons behind the machine or operating faults can be done quickly. The availability of automation and process guidance systems is improved. If necessary, the service specialist can directly influence the control of the plant.

Teleservice permits the remote visualization and control of the plant, programming of the process control computer and the programmable logic control (PLC). This allows specific analysis of operating and fault messages as well as file transfer, software updates and documentation.

KBIS (KELLER Bolt Information System) is a new digital information platform that provides operators with vast amounts of documentation on their plant and machinery, as well as maintenance notes and operating instructions.



Summary

With this trendsetting project, COROBRIK is taking a new path in the economic and ecological brick production in South Africa. The new plant fulfils all the expectations of those involved, furthermore, it also exceeds them in essential points. For example, the energy consumption could be achieved below the guaranteed consumption value. Thanks to the precision in handling and process control, all products can be manufactured sustainably, and product change-overs can be conducted easily.

The basis for this joint success was down to a combination of factors:

- The substantial number of tests conducted on the raw material during the pre-planning phase.
- Prior intensive examination of the operation of the existing plant.
- The target-oriented project planning of the machines and the equipment.
- The excellent cooperation of both motivated project teams and the conviction for the success of the completed project.
- The mutual trust of the partners in all project phases during the worldwide pandemic.





- 1 Shaping plant
- 2 Fully automatic wet side
- 3 Setting plant
- 4 Production of special formats
- 5 Dryer plant
- 6 Kiln plant
- 7 Unloading system
- 8 Packaging system
- 9 Kiln car cleaning system


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High-tech solutions from tradition



KELLER HCW GmbH · Intelligent Clay Solutions (ICS) · Carl-Keller-Str. 2-10 · D-49479 Ibbenbüren · Germany
☎ +49 (0) 5451 85-0 · ✉ ics@keller.de · 🏠 www.keller.de/ics

KELLER A DIVISION OF GROUPE LEGRIS INDUSTRIES