

Hess Group GmbH, 57299 Burbach-Wahlbach, Germany

New production line for concrete paving stones at Sunroad in South Korea

■ Frank Hoffmann, Topwerk Hess Group GmbH, Germany

Sunroad & Co. Ltd. has been operating in South Korea as a dealer in high-quality concrete products for 10 years. The company led by CEO Sun Ho Jung is regarded as an extremely reliable supplier to the large construction companies and engineering offices in South Korea and the products are used in very large and important projects, not only in the province of Gyeonggi-do. Since the company's aim is constant technical modernisation and further development of the products, taking into consideration the preservation of the environment, as well as an increase in quality and output, a decision was taken to procure a new block-making machine from the Hess Group. The new plant is located in Icheon, about 100 km from the capital city of Seoul.

The core components for the new mixing plant at Sunroad Co. Ltd. were supplied by Wiggert & Co. GmbH. Amongst other things, these included the HPGM 750 planetary counter-current mixer for the facing concrete and the HPGM 2250 planetary counter-current mixer for the core concrete. Wiggert also supplied a skip hoist for the core concrete mixer and the complete control system (WCS) for the mixing plant. The control system (WCS) from Wiggert combines the hardware (power section) and software (Microsoft Windows-based operating system) into an efficient control system.

Some plant components such as the aggregate storage and the feeding of the aggregates to the Wiggert skip hoist/

Wiggert facing concrete mixer were provided to the customer by the local supplier Duksan Tech.

The dosing plant consists of 2 x 5 aggregate bunkers each with a capacity of 40 m³ for the core concrete. The bunkers are fed via a belt conveyor and a distributor belt. A dosing belt under the bunkers weighs the aggregates and fills them into the lifting bucket. The aggregates for the facing concrete are stored in 5 further bunkers (capacity 15 m³ each), which are filled via wheel loaders or from big bags. There are three cement silos, each with a capacity of 110 t. Two silos are used for the core concrete and one for the facing concrete.

The fresh concrete is then taken from the mixers to the block making machine by conveyor belts.

The heart of the plant is the Hess block making machine type Multimat RH 2000-3 MVA with a board size of 1,400 x 1,100 mm and a production area of 1,300 x 1,050 mm. The Hess Group's latest technological developments can be found in this machine. They allow the producer to manufacture the most diverse products in the most effective way, taking into consideration high safety standards, with the simplest possible operation thanks to user-friendly operating systems. A one-piece vibrating table with variotronic is fitted as the vibration system. This servo vibration was developed and patented by Hess.



Sunroad's new concrete block plant



View of the aggregate silos



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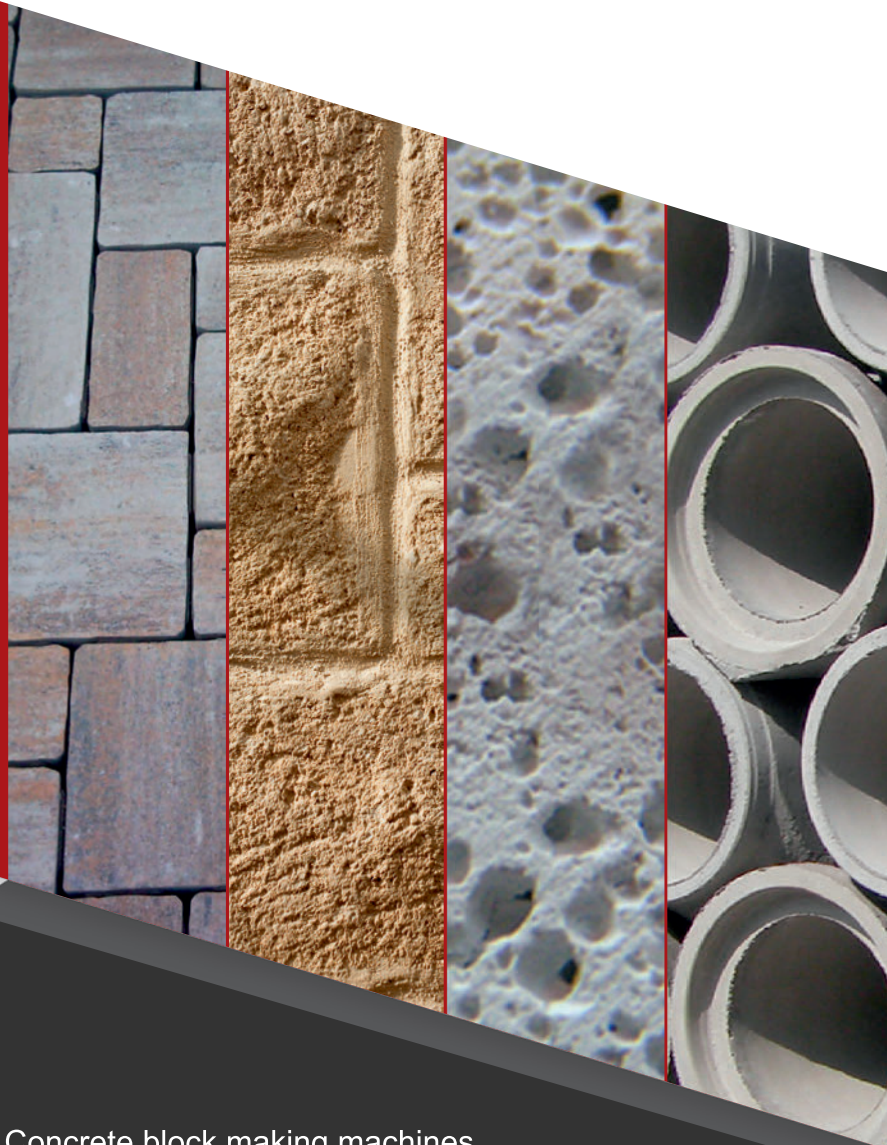
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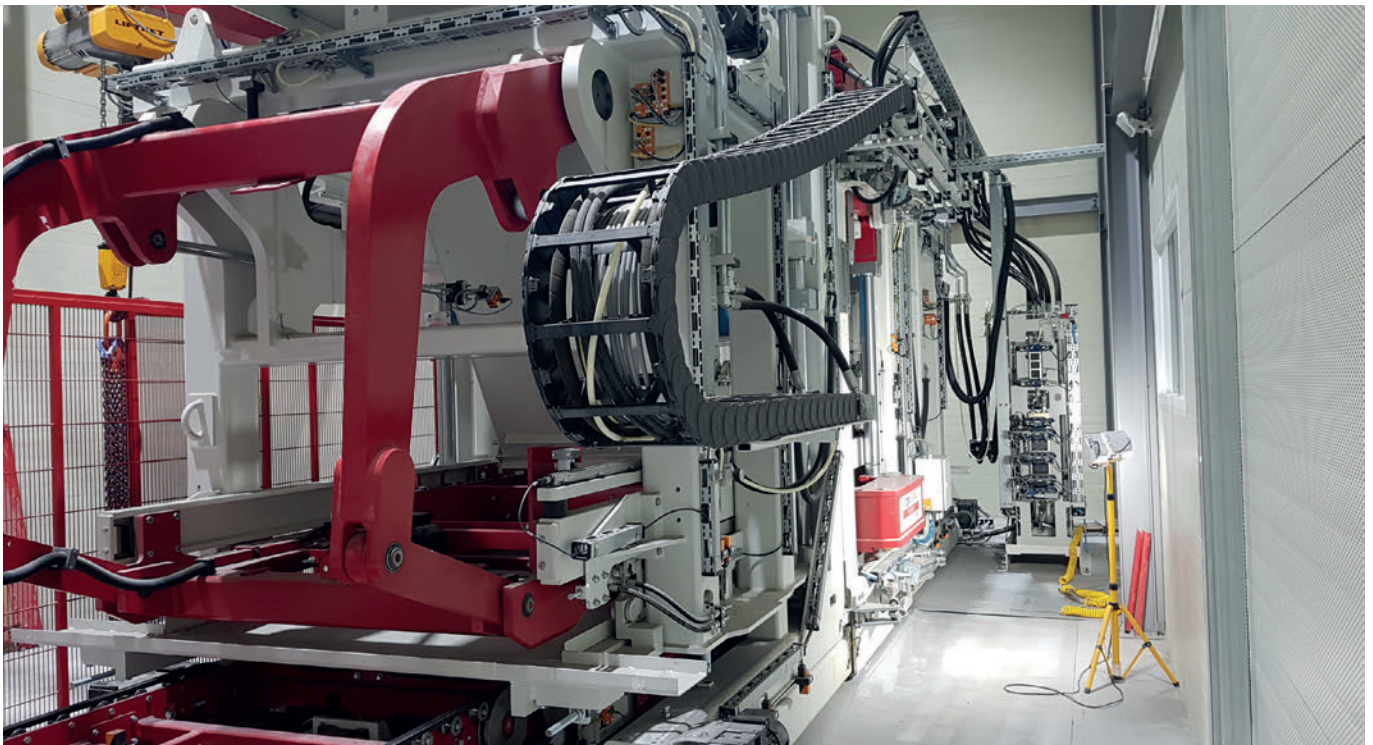
A dosing belt under the bunkers weighs the aggregates for the core concrete and fills them into the lifting bucket.

The machine is equipped with a MAC8 hydraulic controller from Bosch-Rexroth, which has been used by Hess in its static board machines for several years. This system enables the very accurate positioning of feed box, tamper head and mould. The facing concrete feed box is equipped with a driven planing roller. In this combination very high product qualities are achieved with low cycle time. A colormix system is installed in the Facemix for the manufacture of multicolour products. The main products are pavers in the most diverse formats.

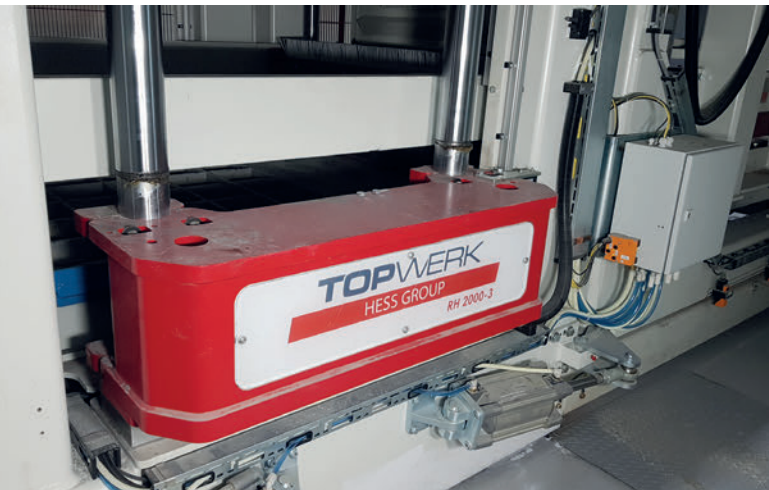
The production boards are transferred from the machine to a lowering device, which sets the products down on a V-belt conveyor. This V-belt conveyor is manufactured as a 5-part conveyor in order to ensure accurate positioning in the downstream units. All drives are controlled in order to ensure gentle transport of the products.

A double washout unit is installed in the transport system on the wet side. The fresh products can be washed out here with high-pressure water on two production boards at the same time to refine the surface structure. The surface is cleaned after washing by means of a clear rinsing system. In order to drain off the water from the production boards they are raised for the washout process and additionally blown off with air. Located in front of the elevator is a tipping station. Concrete residues that accumulate during the emptying of the machine when changing the product or at the end of a shift can be automatically disposed of into a waste container here.

Located at the end of the transport section is a 14-tonne elevator with 28 levels. The products are stacked here and



The heart of the new concrete block line is the Hess Multimat RH 2000-3 MVA block making machine



A one-piece vibrating table with variotronic is fitted as the vibration system.



A double washout unit is installed in the transport system on the wet side.

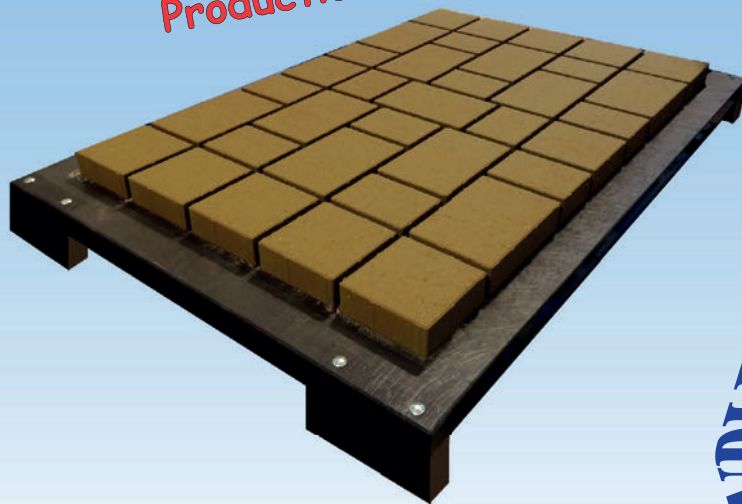
transferred to the finger car for transport into the drying rack. The elevator is located in the large-volume chamber in which the racks are also accommodated. This benefits the subsequent product quality as unfavourable environmental impacts can largely be ruled out in this way. The 14-tonne finger car is designed for the single board and is equipped with a turning

device. The lower platform is supplied with power via an energy chain, while the upper platform is supplied with power via a cable drum. The lower and upper platforms are positioned by laser measurement which, together with the controlled servo drives, allows highly dynamic, precise positioning.



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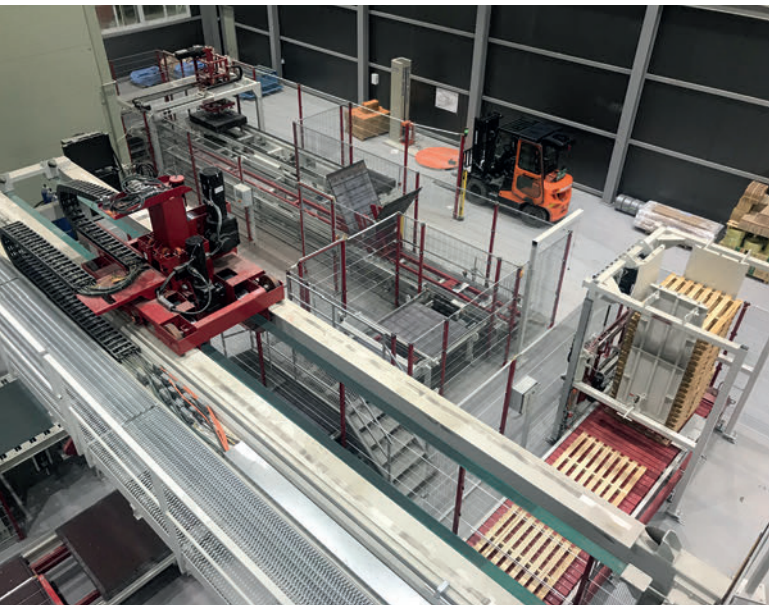
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View of the dry side

The Rotho curing chamber in a large-volume chamber design consists of 14 rack aisles, each with 28 levels, and has a total capacity of 4,312 steel boards.

Rotho also supplied an air recirculation system with air pipes made of high-grade aluminium, which ensures a homogeneous climate in the large-volume chamber. Shortened curing times, a saving of cement and higher early strengths can be achieved through the homogenisation of temperature and humidity inside the chamber. All system functions can be controlled conveniently and simply via a touch panel.

Dry side

Following the drying process, the products are transferred from the finger car to the downstream lowerator. The products are transported onwards by a walking beam conveyor. Due to the lifting of the boards they are transported entirely without wear. The feed is controlled by a servo motor.

One of two Topwerk packaging cubers with electric clamps releases the products on the board and pushes them together. Where products are to be blasted, it transfers the layers to the belt conveyor that leads to the blasting plant. A blasting plant from Duksan Tech was integrated for this refinement.

The second fully automatic Topwerk packaging cuber takes the products from the production board or the blasting plant belt conveyor and forms the stone packet on the discharge belt. Three different pallet sizes are used for discharge; these are supplied from the individually adjustable pallet silo.

Packaging is possible with and without transport pallets. A slat conveyor with a length of about 23 m is used for the discharge. As is usual in Korea, these packet belts are located inside the building. Three different pallet sizes are used; these



Packaging is possible with and without transport pallets.

are supplied from the individually adjustable pallet silo. After the packet has left the packet assembly position, a cover sheet is placed on top at the next position to protect the surface of the package. This is followed by the horizontal strapping of the products.

Finally, the packet can be completely protected with a plastic film applied by a stretch wrapping machine. Afterwards the block packets are taken by forklift to the warehouse.

The empty production boards are cleaned automatically with a scraper. The cleaned boards are then turned over and fed to the machine's board silo by a transverse transporter. A board changer above the transverse transporter with down-



An inline blasting plant from Doogsan was integrated for further refinement.



Inauguration of the new Sunroad concrete block plant

stream board buffer track serves the buffering-in and out of the boards.

The operating devices and control cabinets are located in a booth installed centrally in the plant. Siemens S7 controllers with the Siemens WinCC visualisation provide for simple and safe operation of the plant. Local operation is performed using a mobile panel. Fault diagnosis in the case of trouble or remote maintenance of the unit is possible via teleservice. A special feature is the maintenance in the event of a power failure of the 24 V power supply, via which the position data of the controllers and the entire safety signals are supplied among other things. This allows fast resumption of production.

With its investment in the Hess Group's flagship RH 2000-3 MVA machine, Sunroad has put one of the most modern concrete block plants in South Korea into operation. It puts Sunroad in the position not only of being able to produce high capacities, but also to manufacture top quality products and to extend its product range.

The Hess RH 2000-3 MVA at Sunroad is now the fourth to be installed in South Korea in recent years. The fifth Hess RH 2000-3 MVA will be put into operation at the Jeongwoo company at the end of the year.

"We are very satisfied with our cooperation with the Hess Group. The agreed schedule was adhered to as promised. Hess has met our expectations with regard to the delivery of what is for us the best technology in the world. It has made it possible for us to meet our customers' requirements for the delivery of top quality products", says CEO Sun Ho Jung. ■

FURTHER INFORMATION

Sunroad & Co. Ltd.
Minsokgongwon-ro 88, Danwon-gu
15465 Ansan-si
Gyeonggi-do, South Korea
www.sroad.co.kr

TOPWERK
HESS GROUP

Hess Group GmbH
Freier-Grund-Straße 123
57299 Burbach-Wahlbach, Germany
T +49 2736 497 60, F +49 2736 497 6620
info@hessgroup.com, www.hessgroup.com



DUKSAN TECH Co., Ltd
1B 5L Seong seo Industrial Complex, Se cheon-ri, Dasaep,
Dalseong-gun, Daegu, Korea
T +82 53 5831795, F +82 53 5814998
duksantech@paran.com, www.duksantech.co.kr



Rotho Robert Thomas Metall- und Elektrowerke GmbH & Co. KG
Hellerstraße 6, 57290 Neunkirchen, Germany
T +4927357880, F +492735788559
sales@rotho.de, www.rotho.de



Wiggert & Co. GmbH
Wachhausstr. 3b
76227 Karlsruhe, Germany
T +49 721 943460
F +49 721 402208
info@wiggert.com
www.wiggert.com



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