

Topwerk Group, 57299 Burbach-Wahlbach, Germany

Settline Sp. z o.o. invests in a new concrete block production facility

Transkom Białydyga Sp. z o.o., a Polish company with headquarters in Jaryszów, decided to invest in a completely new concrete block production facility, including value-adding lines at its Sieronowice site. To this end, Transkom entrusted the planning and execution of the entire manufacturing and finishing process to the Hess Group, one of the world's leading suppliers of concrete block production systems, and SR Schindler for its fully integrated value-adding technology. Both companies can be found under the umbrella of the Topwerk Group - a leading global group of companies in the field of machinery and equipment for the industrial production of concrete products since 2013. This meant that Transkom was provided with planning, installation and commissioning from a single source - avoiding interface losses due to miscommunication in this way.

Settline sp. z o.o., a company newly founded by Transkom, manufactures paving blocks, concrete slabs, curbstones, and steps, among other things, on the RH 2000 machine supplied by the Hess Group. These products can be processed thoroughly on the subsequent value-adding line. Aging, blasting, curling, coating, and a double splitting line with bypass edge processing and packaging are carried out.

Block-Making Machine

The system's central element is the RH 2000-4 MVA concrete block-making machine. In this case, Settline Sp. z o.o selected almost all options available and can thus proudly present a large portfolio of concrete block products.

The machine frame is very stable and durable. It is made up of solid steel moulded parts in both the lower and upper parts in order to withstand the vibrator's powerful vibration forces. The machine possesses four tamper-head cylinders to ensure optimum block height control. This is particularly advantageous for large formats. The letter M in the description MVA indicates that this is a fast, precise MAC8 control system. The position values of the tamper head, the mould, and the filling boxes are sent as signals to the control system by means of Balluff bar transducers. They are evaluated, then issued as control parameters to the hydraulic valves. This enables real-time communication between components, resulting in overlapping movements that reduce wear and tear on the machine.



RH 2000-4 MVA block-making machine

Variotronic

Hess's well-proven Variotronic is implemented as the vibration system. It consists of four vibration units, each driven by a servo motor. The phase angles between two pairs of vibrators (and thus the vibration force) can be stepless adjusted, and the optimum vibration frequencies can be selected independently for individual vibration processes. A patented Hess face concrete planning roller is installed in the face mix filling box. The roller ensures that the face concrete is filled optimally and prevents it from being dug out unevenly from the box.

Automatic Mould Quick-Change System

Changing a mould is possible within approx. 5 minutes with this system and only needs to be carried out by one operator. The new mould can be placed without interrupting production on the electrically driven mould changing carriage between the board storage silo and the soundproof cabin during ongoing production. When the mould is changed, the old mould with its tamper head is placed on a production board, unlocked, and transported out of the soundproof booth under the face concrete unit. The mould is then automatically ejected on the wet side. In parallel, the new mould travels under the coarse concrete unit on the electric mould

changing carriage into its precise pick-up position and is automatically clamped in place. The facing and core concrete units are raised by means of fast-lifting cylinders in order to accelerate the process.

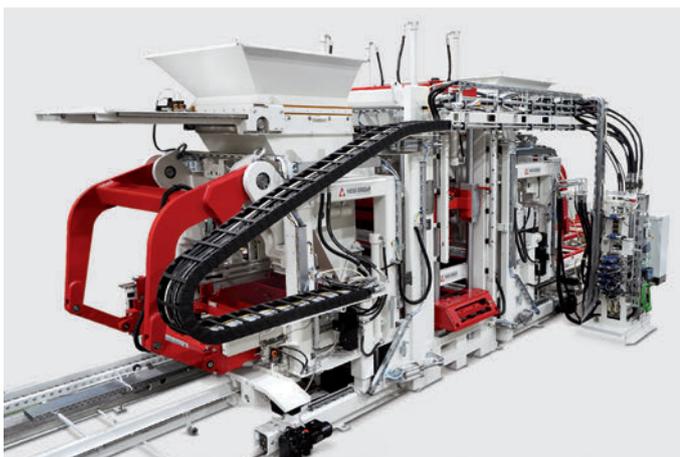
The mould ejection point is located opposite the product inspection point. The product inspection is an additional v-belt conveyor that can eject individual production boards without interfering with the production process. At this point, product heights and quality can be checked without time pressure and production boards can be reintroduced to the wet side by the push button. A walking beam conveyor transports the production boards from this position towards the elevator.

Above the mobile elevating platform is a wash-out system with three stations. This system is a new development from Hess Group, designed to keep the cycle time at this point as short as possible. The production boards are tilted at each station for processing.

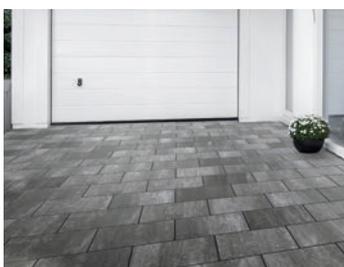
- 1st station - washing out with 2 oscillating high-pressure nozzle bars.
- 2nd station - clear rinsing of the washed-out surface through a flushing box.
- 3rd station - blowing off the excess water to avoid dripping in the curing rack.



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View into the curing chamber

Behind the wash-out station is another inspection point to check on the washed-out products. An impregnation device is installed in front of the elevator to seal their surfaces or to apply special agents.

Curing Chamber

The drying chamber made by Rotho is designed as a large-volume climate chamber for a total of 7.800 Assyx production boards and has automatic temperature and humidity control. The elevator, lowerator, and finger car can each hold 30 production boards with a rack spacing of 200 mm. This is possible because the production boards have a width of 1.520 mm so that the forks of the finger car can be inserted beside the products. If necessary, only every second level need to be occupied in order to store higher products in the curing chamber.

Dry Side

On the dry side, there are two parallel transport systems that have been executed as walking beam conveyors. This means that two different products can be transported at the same time, standard products can be cubed and another product refined at the same time. Both lines are connected with a bypass immediately after the lowerators in order to be able to supply one line from two lowerators if required (e.g., mixed operations). On both dry sides, there is a station for quality inspection after the lowerator.

Cuber 1 has a 34.00 m long travel track from which both value-adding lines can be fed. Offline Input is also possible through the offline infeed system. With the newly developed Cuber from Hess Group, overlapping movements are possible to keep cycle times as short as possible. Thanks to a special program and gripper bars, it is also possible to remove curbstones individually from their production board so that they can then be fed as a single piece to the shot-blasting machine. Later, these are grouped again on an SR Schindler grouping table and by Cuber 3 subsequently packaged. This process has fulfilled the customer's request for the automated, two-sided shot-blasting of curbstones.

Line 1

After product inspection, a stone squeezer pushes the concrete products together on the production board. To protect the product's surface, granulate can be applied on the products by an automatic dispenser, or, in the case of curbstones, wooden bars will be laid on top of each layer by using SR Schindler's automatic wood bar applicator. The transfer from line 1 to packaging line 1 is then carried out by Cuber 2, which also moves dynamically with overlapping precision movements whereby layers are stacked rapidly and accurately. Cuber 2 also has two carriages installed on the same track that can be positioned completely independently of each other. With its hydraulic clamp, the second carriage serves the value-adding line and packaging line 2. Empty production boards are conveyed further on line 1 through



General overview of both dry sides

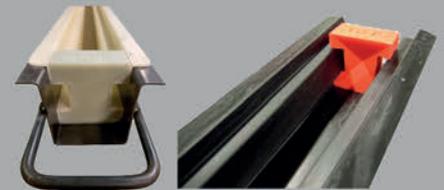
a board brush to remove any adhering residues. The production boards are then rotated 180 degrees in a turner to avoid one-sided wear. A package of 30 production boards is formed in the board stacking unit. The board buffer finger car transports board stacks from lines 1 and 2 and subsequently transports them to the block-making machine's board storage unit or to the board buffer rack. The board buffer rack has a capacity of 3,960 production boards, which corresponds to approx. 50 % of curing chamber capacity.

Packaging Line 1

Packaging line 1 is mainly used for packaging unrefined products. A transfer unit conveys empty transport pallets in the outside area onto an underfloor chain conveyor into the production hall. Both packaging lines can be supplied with different types of transport pallets. This again has fulfilled another of the customer's wishes

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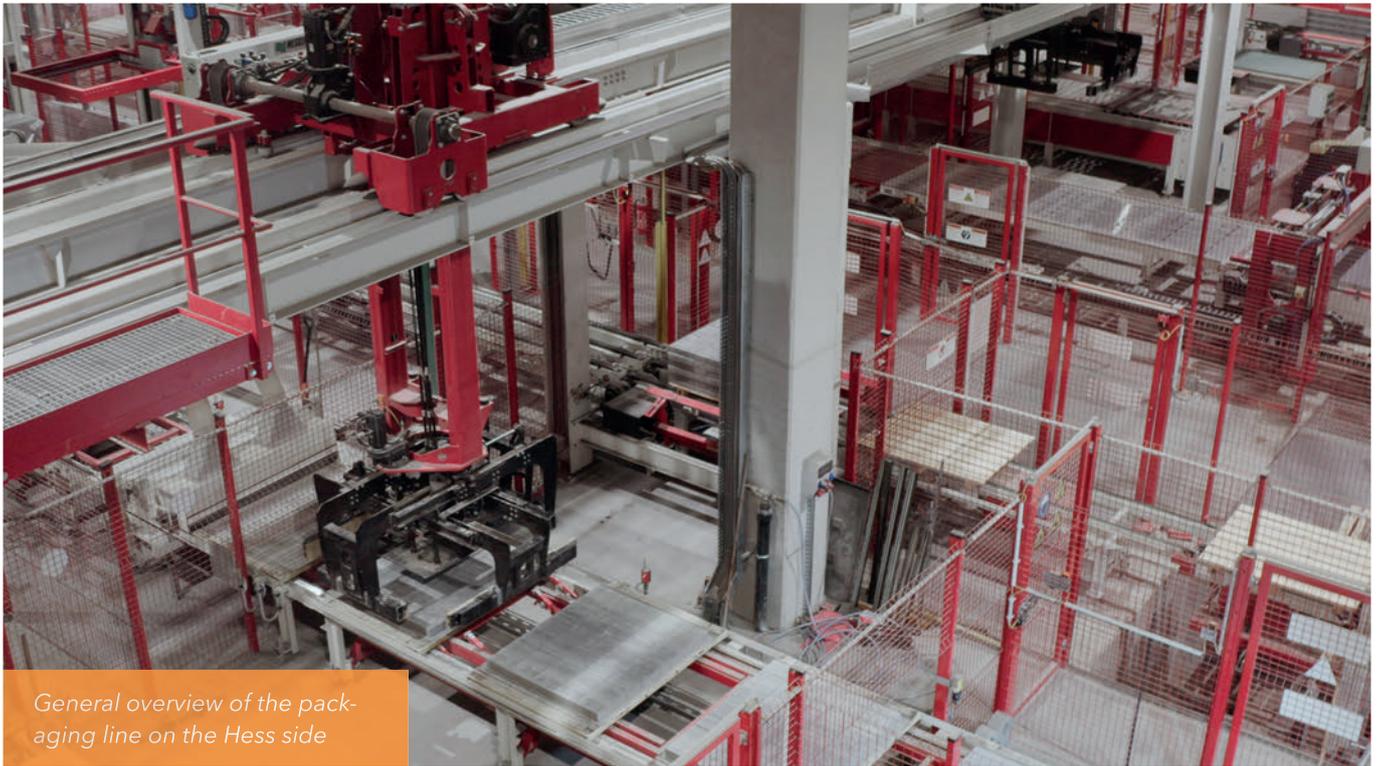
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General overview of the packaging line on the Hess side

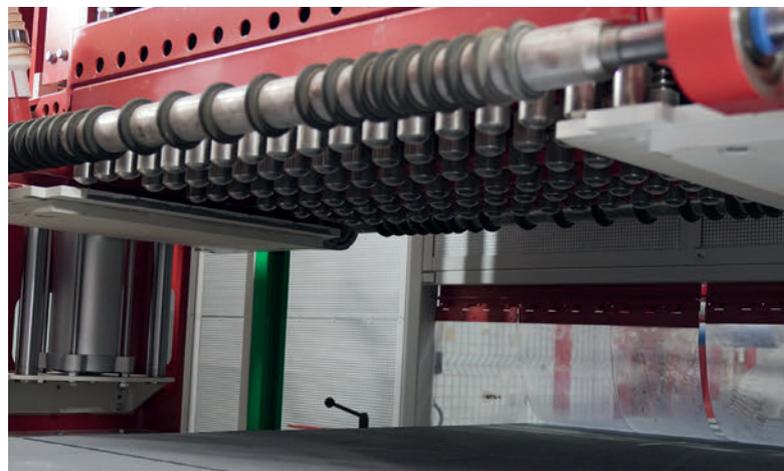
to have virtually no forklift operations within the production hall. In order to regain a transport height of 700 mm, there is a lifting station with a turntable at the end of the chain conveyor, which brings the transport pallets onto the packaging line. A package is formed on the pallet by cuber 2, and then a cover sheet with the company logo is applied. The package is strapped horizontally and vertically and then transported onto a buffer track to the outside area for collection by their forklift with double forks.

**Value-adding Line:
Aging - Blasting - Curling - Coating**

Cuber 1 conducts block layers either directly from production boards or as stacked layers from external input to this value-adding line. Once cuber 1 has positioned a block layer, the layer pusher moves it in an endless stream into the SR Mega 6000-C-DUO aging machine. The products pass through this high-performance machine using the machine's own conveyor belt. Two machine bridges with side stands are installed above it to accommodate one aging unit each. The machine features a heavy-duty steel design. The two machining supports can be moved pneumatically in a vertical direction and are each equipped with hammer mechanisms that move laterally whilst oscillating. These hammer mills each consist of 105 spring-loaded aging hammers, each mounted on six quick-change carrier beams. Foil can be inserted between the products and the aging hammers by means of an additional foil dispenser. This foil running between the product layers and hammers during machining prevents surface damage. Only the edges are then broken.

The Polish company installed a soundproof chamber for the aging machine in order to protect the employees from the high noise level it generates. A cartridge filter system extracts the dust produced during processing.

The aged products are then transported in individual layers to the SR-1250 shot-blasting machine via a 2.00 m long accumulation roller chain conveyor and a layer pusher with a transfer table and pneumatic side clamping. In the shot-blasting machine, equipped with a cross-ribbed rubber conveyor belt, products are bombarded with steel or stainless steel pellets via two turbines, each powered by an 18.5 kW frequency-controlled motor. A third turbine has been installed



Hammer mills with 105 spring-loaded aging hammers



Shot-blasting machine

for shot-blasting curbstones. This process roughens the block surfaces and brings out their granularity. The shot-blasting material remaining on the products' surface is automatically removed by means of an integrated high-pressure blower. A longitudinal screw conveyor then feeds the shot-blasting material to a bucket elevator and from there to the cleaning unit. The material can be fed into a new shot-blasting process once cleaned. If the conveyor belt comes to a standstill, the supply of shot-blasting agents to the turbines is automatically interrupted, preventing any over-blasting of products and, thus, manufacturing rejects.

Another layer pusher with a transfer table and pneumatic side clamping transports the shot-blasted products again in a continuous flow into the downstream CA-1200-4 curling unit, including a blow-off device at the outlet for cleaning the concrete elements. Setline Sp. z o.o. opted for a curling machine consisting of two tunnel segments, each with two curling stations, each equipped with an approx. 22 kW frequency-controlled motor. The four curling brushes are all equipped with carborundum trimmings. The hardness of the brushes varies, so excellent results can be achieved by employing different stations. The supports can be adjusted in height using an electric motor. The brush pressure is automatically regulated by the brush drive's current consumption. This ensures uniform brush pressure on products and evens out brush wear. The curling stations are set up at an angle to the conveying direction. The brushes run in alternating directions of rotation, i.e., brushes 1 and 3 run in opposite directions to brushes 2 and 4. This prevents line marks and processes any irregular surface structure of the products completely. The curling machine is controlled by means of a Siemens SPS-S7 control system. It is operated via a 12" touch panel. The dust is extracted using another cartridge filter system. After the curling unit, the products are transported further via an accumulation chain conveyor.

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The products are transferred to the coating line via the following double-layer pusher with a transfer table and pneumatic side clamping. They are conveyed in layers through the individual stations of the first primer coating line by means of an approx. 15.50 m long scraper floor conveyor. The scraper floor conveyor's sliding beams work in both directions. Whilst one layer is being pushed and positioned, the beam dives under the docking plate to retrieve the next layer.

The products first have to pass through an infrared preheating tunnel equipped with six heating cassettes, each with seven infrared lamps. There, the products are heated to the right temperature so they can be sprayed with solvent-free lacquers from above in the following primer coating station. These products, which have now been primed from above, are then dried in the next infrared heating tunnel downstream

with the help of six heating cassettes, each with seven infrared lamps.

The following layer pusher with transfer table and pneumatic side clamp now transport the products onto an approx. 9.00 m long slat conveyor positioned at right angles, from where they are transported by another layer pusher of an identical design onto the second sealer coating line. This runs parallel below the first primer coating line but with the conveying direction now running in the opposite direction. The products next travel through a second sealer coating station designed for solvent-free coatings via a scraper floor conveyor, which is also approx. 15.50 m long. This station - like the primer coating station - consists of a low-wear compressed air diaphragm pump with pulsation dampener, a non-dripping low-pressure spray bar with five nozzle units with all the necessary valves, a flow meter, a touch panel with a power supply unit and housing with a connection for the extraction system provided by the customer. At the end of this coating line is another infrared heating tunnel of the same design that dries the coated products from above.



Coating line heating module

Value-adding Line: Splitting - Edge Processing

Cuber 1 conducts block layers either directly from their production boards or from external input onto the sliding grate of the splitting line. Here, the layer pusher moves a block layer into the first Split 1200 machine to be split laterally. The layer pusher is equipped with a displacement measuring system so that the blocks being split can be positioned precisely under the splitting knives. It also has vertically displaceable pneumatic carrier devices, which are lowered during backward movement. This makes it possible to place the next layer of blocks on the conveyor during insertion.



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Transfer after edge processing

In the splitting machine, the upper and lower splitting knives work on a pincer principle. This means that both knives are continuously pulled together with full force compensation until splitting takes place.

The retaining devices for the upper and lower knives are movable within the inner double frame. The main splitting cylinder is also attached to the crossbeam of the inner double frame. Optional hydraulic side knives can support splitting processes for high products. Splitting quality is visibly improved as the product is split into four sides at the same time. The upper knife holder on the main cylinder is mounted in a movable manner. This allows the upper knife to adapt to irregular products. A triple-layer pusher with a waste flap and turntable has been installed after this. The first layer pusher picks up the laterally split products and transports them to a turntable. This rotates the products by 90° so that longitudinal splitting can take place in the second splitting unit. A second layer pusher transfers the products from the turntable to an intermediate position. A third layer pusher is equipped with a displacement measuring system and feeds the products to the second Split 1200 splitting machine.

This configuration with two splitting machines arranged one after the other and the 90° turntable in between enables products to be split longitudinally and transversely in an automated linear sequence. After the longitudinal splitting, the products are transported further by means of the following layer pusher. A second waste flap has also been installed at this point. Splitting residues are fed through the waste flaps to a conveyor belt system installed under the floor. The products can then either be fed to the edge processing machine or the layers are transported by means of cuber 2 to packaging

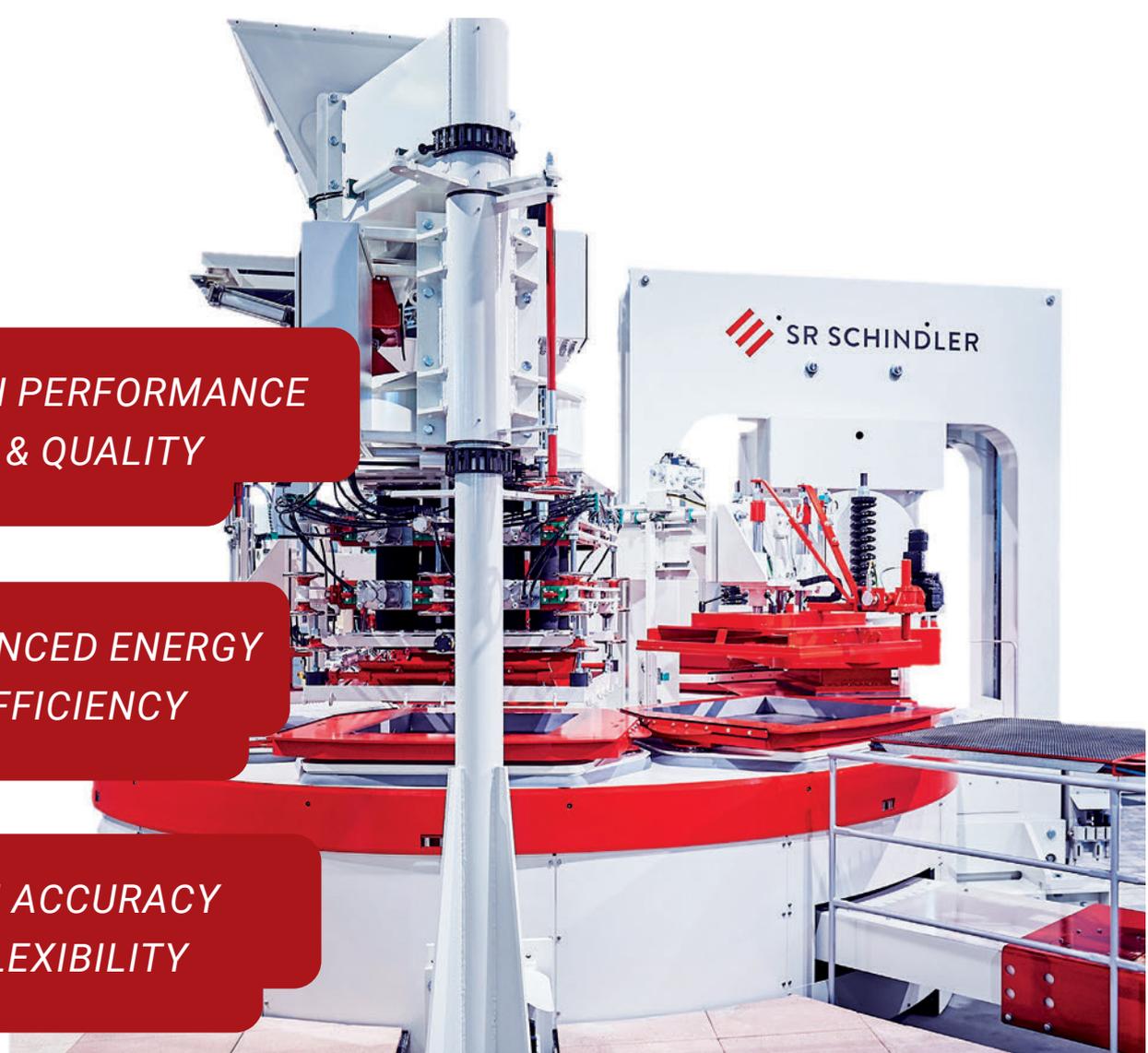
unit 2, where they are stacked on pallets and packaged. For edge processing, products are placed in rows on the edge processing machine with a pneumatic two-sided grab and a 90° turning device. The bypass edge processing unit comprises a bridge support for simultaneously processing the four longitudinal sides, each with a rotating chain driven by a frequency-controlled motor, and a bridge support for simultaneously processing the four vertical edges, each with a rotating chain equipped with a frequency-controlled motor. Appropriate settings for the sides are carried out using a hand wheel. The longitudinal sides are machined in through-feed mode. The vertical edges are knocked off when the product is stationary on a lifting table. Infeed and discharge roller conveyors have been integrated into this machine. A cartridge filter system is used to extract dust.

A second transfer unit downstream with a pneumatic two-sided grab and a 90° turning device reassembles the processed products in layers onto a belt conveyor. The layers are fed to cuber 2 via this belt conveyor and the following packaging unit 2.

Packaging

Cuber 2 supplies packaging unit 1 with block layers from the dry side. Products without value-adding are stacked directly onto pallets at this point. Setline Sp. z o.o. has opted for a covering foil applicator and a horizontal and vertical strapping machine regarding the packaging concept at packaging unit 1. An additional automatic ledge dispenser has been installed on the dry side for, e.g., curbstones. There is rarely any need to refill the ledge storage unit due to its generous volume.

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Finished block package with covering foil

Cuber 2 supplies packaging unit 2 using a second transfer carriage. The block layers arrive here either from the splitting line or the aging-blasting-curling-coating value-adding line. A combined interlayer dispenser has been installed at the stacking position in order to automatically insert an intermediate layer between block layers or between a block layer and the pallet as protection against tannic acid and surface damage or to apply a covering foil for protection against the effects of the weather. The intermediate layer can be a net, a foil or similar. A horizontal and a vertical strapping machine have additionally been installed at packaging unit 2.

Both packaging lines still have reserves for possible future packaging machines. The lines can be retrofitted without problem since they have been fitted with segment drives.

Settline Sp. z o.o. utilises three different kinds of pallets. These are deposited into the empty pallet storage area by forklift trucks outside the hall. An empty pallet transfer unit picks up

the desired type of empty pallet according to requirements and places it on the conveyor system. The empty pallet is then fed to packaging units 1 and 2 underneath the floor in the hall.

Control Unit

The entire value-adding and packaging lines are controlled via several Siemens PLC S7-1500 control units featuring decentralized operating panels with visualization.

To facilitate controlling the entire paving block value-adding process, Settline Sp. z o.o. opted for a B&B operating and monitoring system consisting of a PC, a 22" screen, and two mobile 10.4" tablet PCs with visualization for the complete finishing and packaging process. Recipe management can save all the settings for a particular product. The entire line can, in this way, be very easily adapted to any particular type of product.

Packaged products in the outside storage area



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"We are able to fulfil even the most demanding customer requirements with the aid of the new block-making machine and the new value-adding and packaging systems. We would like to thank Hess Group and SR Schindler for their good cooperation and see ourselves well equipped for future product requirements thanks to the installation of these new systems", the sales manager says. Setline Sp. z o.o. is ideally positioned for all customer requests with its state-of-the-art facility and value-adding machines that have been installed. And space has already been earmarked for corresponding expansion, should further value-adding requests arise. ■



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FURTHER INFORMATION



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