Topwerk Group, 57299 Burbach-Wahlbach, Germany

Drog-Bruk commissions new production and finishing line for concrete blocks

Hess Group GmbH and the SR Schindler Maschinen-Anlagentechnik GmbH mechanical engineering company from Regensburg – both companies are members of the Topwerk Group operating on the global market – have commissioned a new production and finishing line for concrete blocks at Drog-Bruk, a highly regarded Polish manufacturer. Drog-Bruk was founded in 1999 and is today one of the leading manufacturers of paving blocks in Poland. The company commenced production at that time with a Hess Group multi-layer block machine.

Due to increasing demand, Drog-Bruk invested in its first circulation system with a RH 1500-3 VA from Hess Group in 2010. Drog-Bruk was able to expand its production continually in the following years as well. The company believes in giving competent advice, for example through the 3D planning of outdoor facilities of high-quality properties, in order to meet the constantly growing quality demands of their customers.

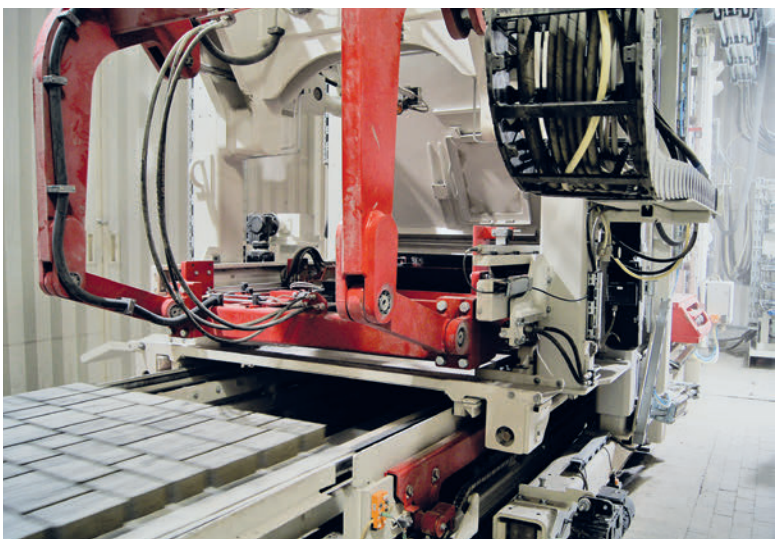
In fact, with a view to meeting their customers' requirements for high-quality paving, Drog-Bruk decided to invest in a new high-tech block production system with integrated finishing technology. The Hess Group and SR Schindler combination made a convincing impression with a well thought-out system concept and state-of-the-art technology and was selected as supplier for the system. The purchase of the entire production technology from one source was a further advantage for Drog-Bruk. The contract was concluded with Hess Group as general supplier for the system technology. This meant that responsibility rested solely in one place and all interface problems could be avoided.

Drog-Bruk have been able to further expand their product portfolio with new, high-quality products as well as their position on the Polish market using the system commissioned by Hess Group and SR Schindler in 2019.

Hess RH 1500-4 MVA

Drog-Bruk opted for the latest generation high-performance version RH 1500-4 MVA concrete block making machine. This features, among other things, a very robust machine frame, which ensures excellent vibration force conduction into a product, and thus guarantees a long service life for the machine as well. Fast cycle times are achieved on the one hand through its special high-performance control unit, while also ensuring particularly quiet and gentle operations on the other. Due to the control unit's great precision, repeatable movements can be attained even at high speeds – something which is of crucial importance for filling, compaction and product quality. In addition, setting speeds in the visualisation system is particularly easy and user-friendly.

Overview of the system: on the far left the wet side, in the middle the dry side and on the right the finishing lines



The new RH 1500-4 MVA machine generation from Hess Group

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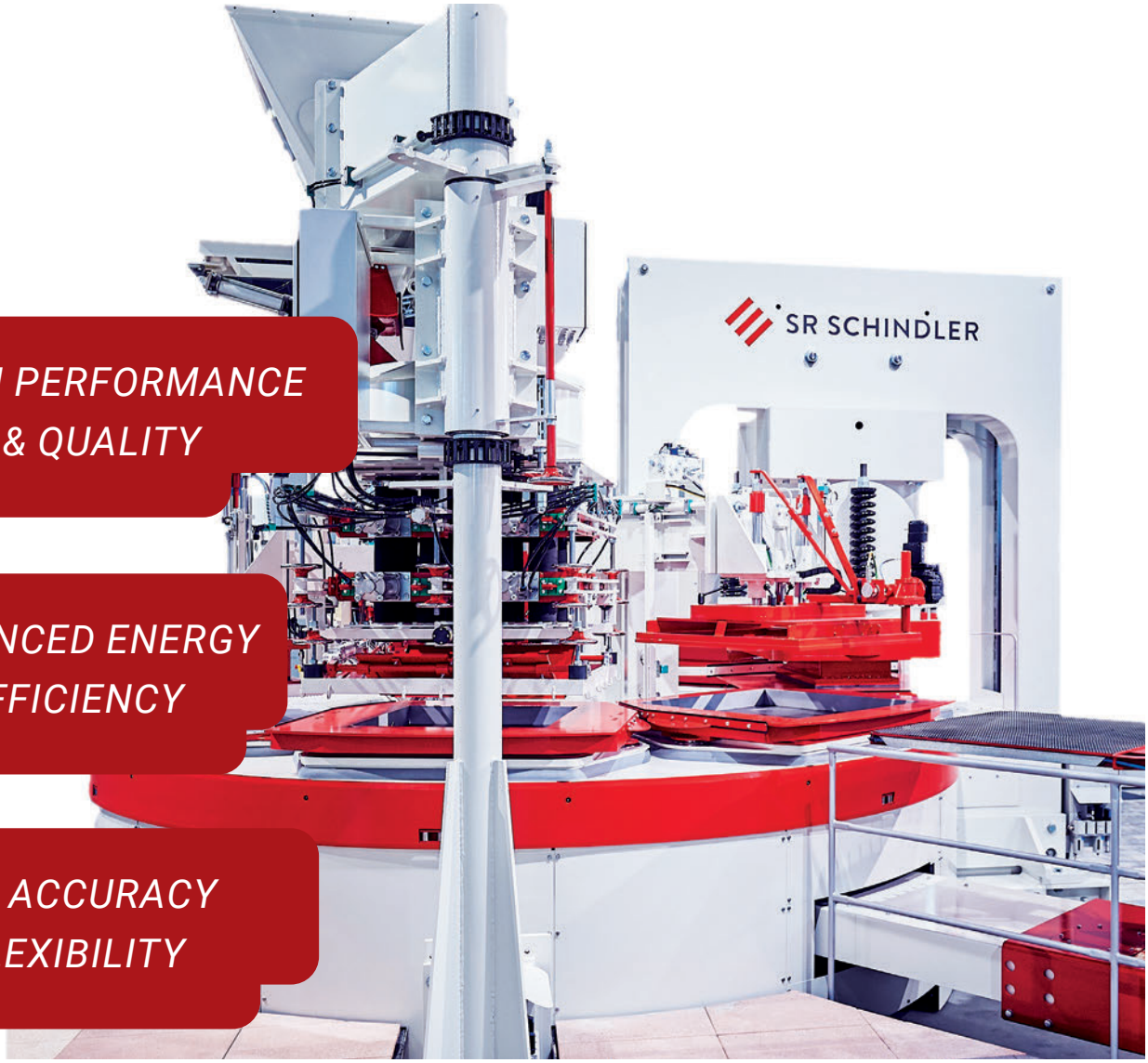

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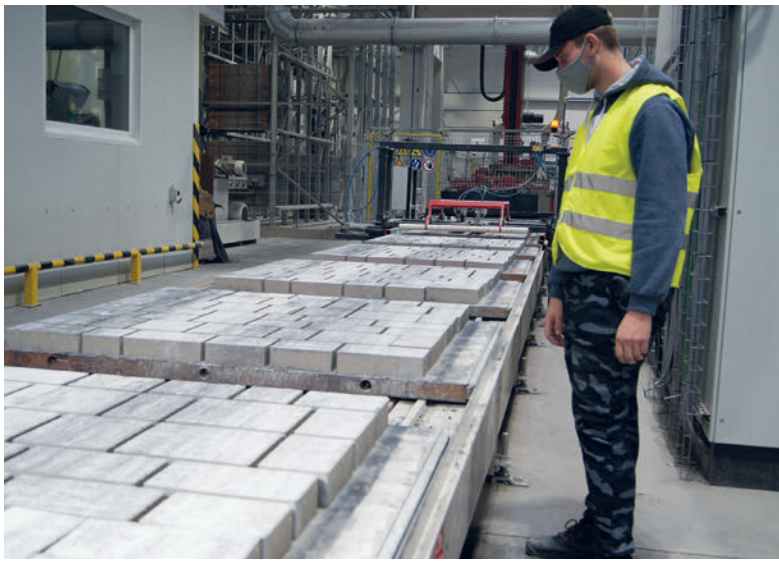
Lowerator and finger car unit are located within the Rotho large chamber rack system with a Pro Cure heating system



Quality control on the dry side

A Colormix unit and a double washing unit offer further finishing possibilities on the wet side. Fresh products are transported on a V-belt conveyor to the elevator.

Boards can be ejected at the control station so that appropriate quality controls can be carried out unhurriedly. The boards are then fed in again on the wet side.

The rack system was supplied by Rotho. Its large chamber was encased in housing and fitted out with a Pro Cure air circulation and heating system. This ensures that products can be cured under uniform conditions and conducted to downstream finishing processes with uniform surface hardness and strength.

The first step on the dry side is quality control. The production boards are then transported by a walking beam conveyor from the lowerator to the finishing line or directly to the packaging unit.

After the products have been stacked by the packaging unit, the boards are cleaned, turned and returned to the wet side with a board finger car unit or placed into intermediate storage in a buffer rack. The size of the board buffer has been so designed that 50% of the boards can be factored out if only every second level is occupied by high products in the rack system.

Finishing on two lines

The SR Schindler finishing system is basically divided into two lines: the aging-curling line and splitting line. Both lines are set up for a maximum 1,200 mm working width and maximum 350 mm product height. Overall, the conveyor and handling technology can transport layers of up to 750 kg.

View from the control cabin towards the dry side; in the background is the SR Schindler curling machine

The two lines can be fed from both production boards and the outside storage area. Infeed and removal are handled by continuous layer stackers at the infeed and discharge points of both lines. The lines are set up parallel to each other; the direction of conveying is from left to right. Both layer stackers are each equipped with two carriages, each with an electro-mechanical 4-sided clamp and turning device. In this way, both lines can operate independently from each other and

Layer stacker with carriage and motorised 4-sided clamp

transfer processed products to their respective packaging line. Products from production boards can, for example, be fed into the aging-curling line and products from outside storage can be fed into the splitting line.

SR Schindler Mega 6000 Duo

The SR Schindler aging-curling line transports block layers on a 15 m long heavy-duty fabric belt through the two processing supports of the Mega 6000 Duo bush hammer aging machine and the two curling machine tunnel segments. Layer pushers ensure that they pass through the processing supports in an endless stream. An accumulation roller chain conveyor with stopper system facilitates visual control by the operator after the curling machine and, thanks to its free spinning rollers, easy replacement of individual blocks if necessary. A stopper system and a layer separator break up the endless stream and once again reformat the block layers to be packed.

The processing supports of the bush hammer aging machine are each composed of six quick-change beams, each equipped with 105 hammers. These will be bush hammers or aging hammers depending on the machine process.

Support with aging hammers

The bush hammer frequency and impact energy parameters are adjustable so that processing can be adapted to block hardness and programmed for the desired surface appearance. In addition to vertical processing by bush hammering, the supports move in frequency-controlled oscillations. There are anvils under the belt in the processing area.
The SR Schindler Mega 6000 Duo can create four different surfaces:

- Paving blocks with a chamfer are only bush hammered on the surface so that the chamfer is preserved and forms a frame that gives the block a more high-class appearance.

- Paving blocks without chamfer are simultaneously bush-hammered on the surface and processed on the edges. Broken edges are created, which lend the block a rustic, aged appearance.

- If round hammers are utilised, a surface comparable to tumbling/antiquing in a drum is created. The decisive advantage with the Mega 6000 Duo, however, is that the block layers are preserved and do not have to be sorted again for transport after processing. The products' facing layer always points upwards and renders turning superfluous. Spacers, edges and underside are retained and with them ease of installation. This is indispensable especially for layers with different block formats.

- A foil dispenser integrated into the system prevents surface damage caused by the aging process. The film runs between the block layers and the hammers during processing, so that only the product edges are broken and the block surfaces retain their beauty as if straight from production. In this way, products can be aged without leaving hammer marks on the surface.

Regardless of whether bushhammering or aging is to be carried out, the quick-change bars pre-mounted with the respective hammer type and a supplied tool exchange carriage with the system make it possible to change tools over rapidly.

A curling machine with two tunnel segments and a total of four frequency-controlled curling brushes with pressure regulation and different brush thicknesses has been set up on the conveyor belt system of the aging unit. At this point, product surfaces are freed from residual dust and smoothed by brushes after bush hammering/aging. The surface feels soft after processing and has a slight gloss.

Depending on product characteristics, the belt speed, contact pressure and rotational speed of the brushes can also be adjusted on this machine; the parameters can be saved and stored for the respective products.

The brushes are suspended at an inclined position and work clockwise or counter-clockwise, i.e. brush 1 and 3 and brush 2 and 4 work in opposite directions to avoid line marks. They are composed of 13 brush segments each, so that, in case of wear, only the segments affected have to be replaced.

After quality control, the products are pushed in layers onto a slab conveyor. A spraying station for applying impregnation will be set up here at a later point in time.

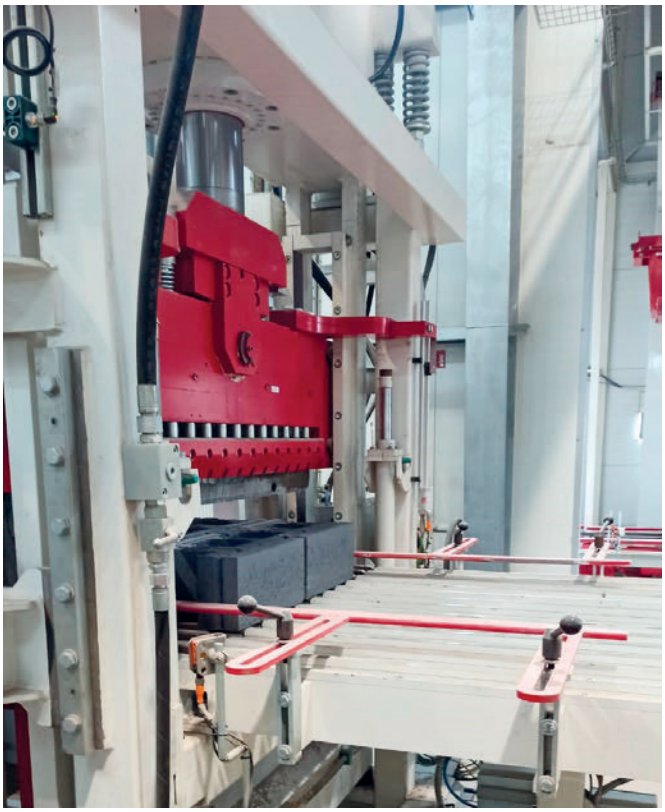
Different surfaces can be created with the SR Schindler Mega 6000 Duo:
a.) Bush hammered blocks, b.) Aged blocks, c.) Blocks aged with foil

At the line discharge point, product layers are placed on transport pallets with the aid of the layer stacker previously mentioned. The finished stacked packages then pass through horizontal and vertical strapping units and can be picked up by a forklift truck at the end of the heavy duty chain conveyor.

Split 1200 splitting machines

The splitting line is made up of two structurally identical Split 1200 splitting machines with a maximum working width of 1,200 mm. These allow concrete blocks with heights from 50 mm to 350 mm to be processed and function using a clamping principle with an upper and a lower splitting knife. The two hydraulically operated knife supports are pulled together with full force compensation until the product is split. Two additional side knives are employed with concrete products of heights from 140 mm to 350 mm so that the product can be simultaneously split on four sides to increase splitting quality. Both splitting lines are delivered with oil heating, oil cooling, hydraulic height adjustment of the upper knife support and flexible upper knives that compensate for height differences between individual products.

The splitting line handling technology consists of layer pushers with a displacement measuring system for positioning blocks accurately under the splitting device, a 90° turntable, so that splitting the products transversely can also be carried



Split 1200 splitting machine

out after their having been split longitudinally, and waste flaps behind the two splitting machines. Waste pieces fall onto waste belts and are discarded into a container.

After the second splitting process, the products are pushed row by row onto a table. From there, they are picked up by a transfer device, which is arranged at right angles to the splitting line. The transfer unit with carriage, which is equipped with a pneumatic 2-sided clamp and 90° turning device, grips a row of blocks, turns it through 90° and places it on the conveyor for the edge processing machine. The blocks now pass through the edge processing machine one behind the other.

The edge treatment machine, which functions in a bypass, is composed of three modules:

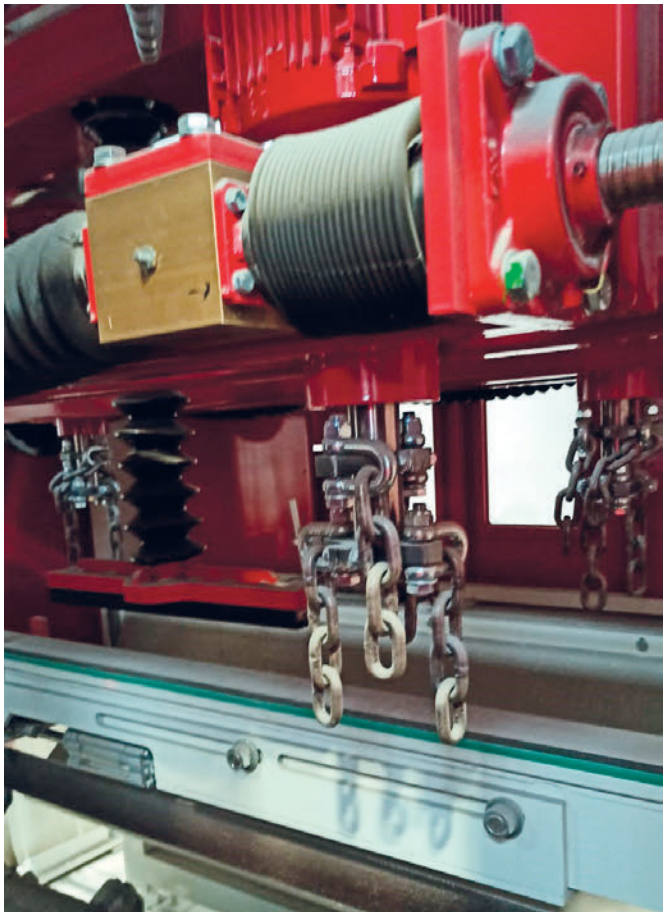
- The 1st module, working in continuous operation, treats one side area of the product with a milling brush set up vertically.
- The 2nd module, also working in continuous operation and consisting of 2 chain impact supports each on the right and left, processes the longitudinal edges of the split blocks above-below and right-left.
- The 3rd module, equipped with a lifting/lowering table, also processes the vertical edges of the products with 2 chain impact supports each on the right and left.

The product stands still and its edges front-back and right-left are randomly knocked off by the chains.

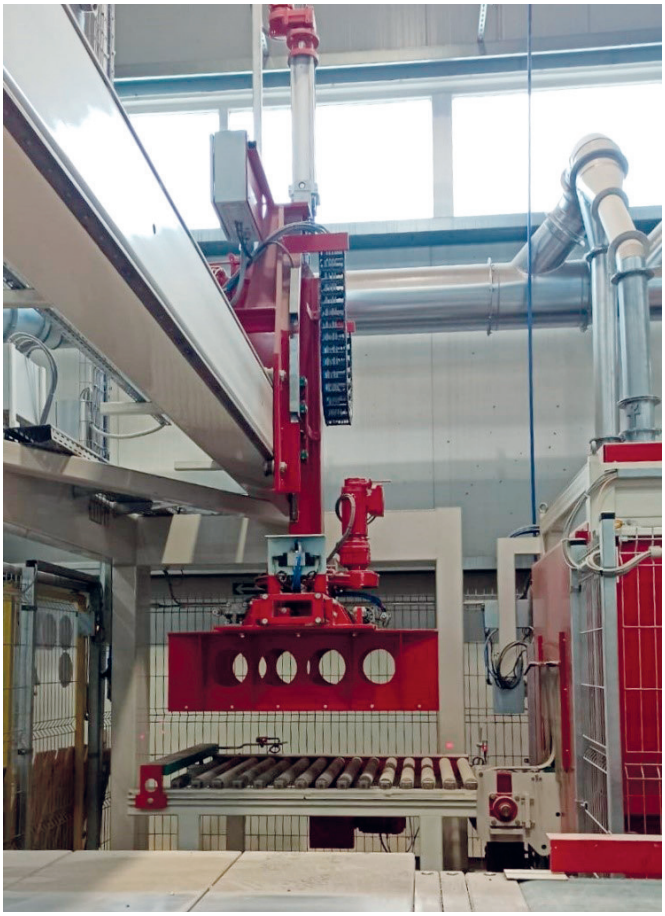
The chain impact supports are frequency-controlled, height adjustable on columns, and laterally adjustable by means of a handwheel. As a result of this treatment with chains, the products lose the sharp edges that are caused by the conventional splitting process and look like broken natural stone.

After edge treatment, the blocks run one after the other in the direction of the second transfer unit, which is identical in construction to the first transfer unit. The blocks are again gripped by a pneumatic 2-sided clamp, turned by 90° and set down in rows on a sliding table. A layer pusher brings the rows together to form a product layer and pushes the layer onto a belt conveyor which transports it to the layer stacker. The layer stacker places layer upon layer upon a transport pallet. The finished package passes through the horizontal and vertical strapping unit on a pallet and is transported to its removal position by means of a heavy-duty chain conveyor.

Transport pallets are conducted to their respective loading stations mainly by means of underfloor chain conveyors. Empty pallets come from a pallet storage unit designed according to the specific dimensions and geometry of a customer's pallets. The storage unit transfers the pallets individually to a chain conveyor with motorised turntable and lifting/lowering device, which orients the pallets according to



Chain impact supports for processing vertical edges



Transfer unit with pneumatic 2-sided clamp

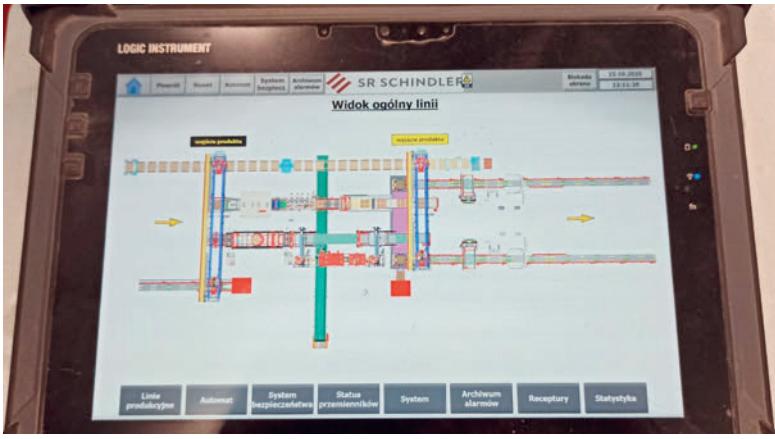
loading. This chain conveyor runs at the same height as the heavy-duty chain conveyor that transports the loaded pallets. The turntable transfers the empty pallets to this heavy-duty conveyor, which brings them to their loading position.

If empty pallets are to be transported to the packaging line for aged and curled products or grey goods, the turntable lowers and transfers the empty pallets to the underfloor chain conveyor. This transports them to a second lifting/lowering station with turntable. There, the empty pallets are transferred to the packaging unit at the height of the heavy-duty chain conveyor and brought into their loading position.

The entire system has been designed for dry operation. The dust extractors required for the aging/curling line and edge processing were provided by the customer according to a technical design by SR Schindler, as was the ducting for the dust extractors and waste belts, for which SR Schindler also provided technical drawings.

The electrical control unit for the entire finishing system is located in 17 control cabinets and is based on a Siemens S7-1500 PLC. The human-machine interface is formed by two mobile tablet PCs with visualisation and texts in Polish and a powerful industrial PC with colour screen. The visualisation represents the system graphically in the main and submenus. Separate preview pictures are included in manually operated pictures and the fault message texts. The cause of the fault and the point, at which the fault occurs, are stated in the fault message texts.

Working parameters can be altered during automatic operations or when changing products in recipe management. When changing products, the alterations are carried out before the new product is entered into the system. Important parameters and recipe management are password protected for a supervisor.

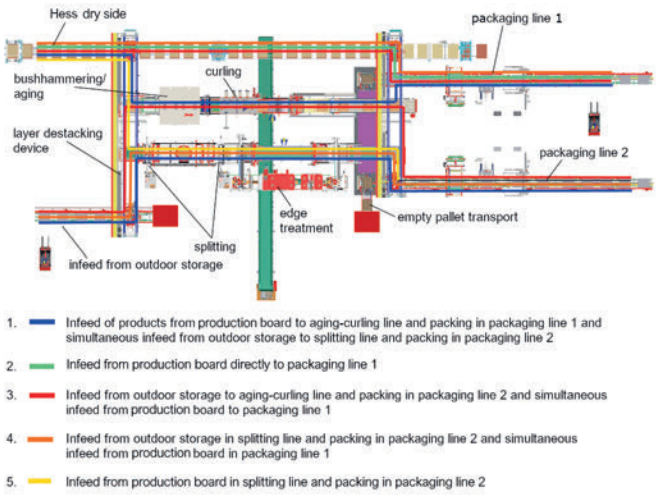


Tablet PC with visualisation

Remote maintenance of the system is possible via VPN router.

The control system must take the required flexibility of the system into account and allow the following processes:

- Infeed of products from production board into the aging/curling line and packaging unit into packaging line 1, as well as simultaneous infeed of products from outside storage into the splitting line and packaging unit into packaging line 2
- Infeed from production board directly into packaging line 1
- Infeed into the aging/curling line from outside storage and packaging unit into packaging line 2, with simultaneous infeed from production board directly into packaging line 1
- Infeed into the splitting line from outside storage and packaging unit into packaging line 2, with simultaneous infeed from production board directly into packaging line 1
- Infeed from production board into the splitting line and packaging unit into packaging line 2



Layout of SR Schindler finishing system

The entire safety technology for the finishing system was designed by SR Schindler. Based on this concept, the security fences and doors were provided by the customer. The electrical safety components were supplied by SR Schindler and integrated into the safety PLC. The safety concept provides for 15 safety areas and allows production to continue in other areas if individual areas are shut down. ■

FURTHER INFORMATION

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