

SR Schindler Steinbearbeitungsmaschinen und Anlagentechnik GmbH, 93057 Regensburg, Germany

One of the world's largest and most modern installations for finishing and packing pavers commissioned in Ireland

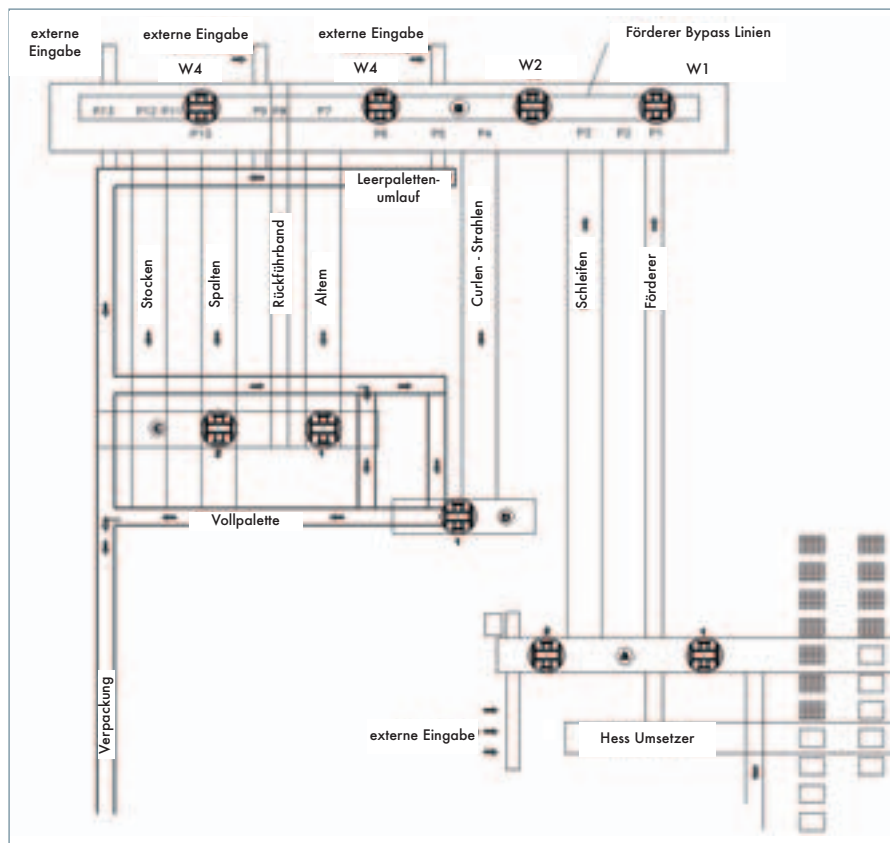
Using advanced technology, production and finishing is taking place on an area of approximately 5,300 m² at Kilsaren near Dublin. Concrete pavers are being manufactured using a mixing installation from Haarup Maskinfabrik A/S, Denmark which consists of 3 cement silos and numerous day silos for face and backing concrete, an RH 1500 pallet machine from the German manufacturer GmbH & Co. KG and 45 different moulds. After curing, which takes approximately two days in vaporised curing chambers with room for 4,600 pallets, the products are passed to a transfer device from SR – Schindler GmbH from Regensburg, Germany or a system from Hess GmbH & Co. KG by means of 2 destackers and conveyor lines.

The Hess Transfer device either stacks the raw cured products on pallets only or transfers them to the conveyor for the Schindler line for finishing. The 25 m long Schindler transfer device A, fitted with 2 clamps, takes the products from the pallet or the external pallet feed and either brings them to the conveyor or supplies them directly to the grinding line. It is therefore possible to transfer products from the pallet to the grinding line while simultaneously transferring them from the pallet to the 50 m long pallet belt which then takes the blocks to transfer

device B with 4 transport carriages (W1-W4). Transport carriage W1 takes the products from the conveyor and places them on a distribution belt running under the floor. This distribution belt conveys the blocks to the transfer device clamps W2-W4 which place the layers on the shot-blasting-curling, antiquing, splitting or bush-hammering finishing lines.

The installation is laid out in a U shape, while transfer device B serves as the cross connection of the U. The shot-blasting cur-

ling, antiquing, splitting and bush-hammering finishing lines are supplied with layers of blocks from here. All these lines run from the transfer device towards the cubing machine which forms the left arm of the U. The right arm of the U is the grinding line which is the only finishing line of the system that can be supplied directly from the pallet by means of the separate transfer device A. Altogether, transfer device B with the transport carriages can collect products from 13 positions and put them down at 13 positions as well. The travel way of transport car-



The installation is laid out in a U shape, while transfer device B serves as the cross-connection of the U



Conveyor



Conveyor with transport carriage W1

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	P13	P12	P11	P10	P9	P8	P7	P6	P5	P4	P3	P2	P1
W1													
W2													
W3													
W4													

Altogether, transfer device B can collect products from 13 positions with the transport carriages and put them down at 13 positions as well.

riage W1 runs from the product take-off conveyor to the under-floor distribution belt product delivery point, grinding-line product delivery point and shot-blasting-curling product delivery point (P1-P4). The travel range of transport carriage W2 partly overlaps the travel range of carriage W1 and can move from the grinding line delivery position, via the shot-blasting-curling delivery position to the pallet feed take-off position, underfloor distribution conveyor take-off position, antiquing delivery position and return belt pick-up position (P3-P8).

Transport carriage W3 also encroaches onto parts of the travel range of transport carriage W2. Their starting positions are as follows:

- Underfloor distribution belt take-off position (P6)
- Antiquing delivery position (P7)
- Return belt pick-up position (P8)
- Pallet feed take-off position (P9)
- Splitting delivery position (P10)
- Underfloor distribution belt take-off position (P11)

The last transport carriage also overlaps and moves to the pallet feed take-off positions, split delivery, underfloor distribution belt take-off, bush-hammering delivery and pallet-feed take-off (P9-P13). The overlaps can be clearly seen on the graphical presentation. It is these overlaps in particular which guarantee maximum flexibility for processing the different products and allow continuous finishing even if one of the transport carriages should break down. It is therefore possible to split and antique external products while grinding, shot-blasting and curling blocks from the pallet machine simultaneously. Of course, the system only operates with this complexity when any possibility of collision has been ruled out by the control technology.

The overall SR Schindler system consists of:

- Grinding line
- Shot-blasting and curling line

- Antiquing line
- Splitting line
- Bush-hammering line
- Empty pallet circulator
- Packing machine

All the lines are designed for a maximum layer size of 1,200 x 900 x 250 mm and are processed with a long side alignment of 1,200 mm with the transport direction. Thus, all the lines are designed for a working width of 900 mm. The smallest individual blocks are 200 x 100 mm and are arranged with the long side aligned with the transport direction which means that no special conveyor technology with accumulating roller chain conveyor is necessary.

Grinding line

The grinding line is designed for dry operation but can be converted for wet operation at any time if the proportion of cured blocks, which must not exceed 50% during dry grinding, does not allow a satisfactory grinding result with the dry method. The line is equipped with 2 drum turners for turning the block layers 180° before calibration or grinding, accumulating roller conveyors for forming continuous runs and layer separators after calibration or grinding. The calibration machine has 3 stations, the grinding machine has 6 of the same. Calibration is especially recommended for products which have high tolerances for manufacturing reasons. Without calibration, the differences in height would make it impossible to place the products level on the armoured bed of the grinding machine. The inevitable result would be non-uniform processing.

Grinding depends on the product and is carried out by means of product-specific parameters for rotation, contact pressure and height adjustment stored in the controller. The first 4 stations are fitted with 55 or 45 kW motors for milling or coarse grinding. The two last stations are provided with planetary motion grinding heads patented by SR - Schindler GmbH. With these grinding heads, not only do the tool-holder plates rotate but also the tools them-

selves. In this way, the tool engagement can be kept short and the tool prevented from heating up during dry grinding. Since dry grinding can leave visible milling marks, the gyrating tool removes these marks as well. A sintered lamellar filter is used for dust extraction. The dust produced during calibration and grinding is collected in a container in the hall and can be reused in the concrete mix.

Shot-blasting and curling

After grinding, either the layers can be picked up by transport carriage W2 of transfer device B by means of the clamp and passed to the belt conveyor of the shot-blasting and curling line, or the layers can come from the distribution belt or the external feed by means of transport carriage W1 or W2. The products fit lengthwise in



Grinding line



Shot-blasting curling line

the shot-blasting machine which blasts them with steel shot (\varnothing 0.6 - 0.8 mm) using two 15 kW turbines. A pusher then pushes the layers together to form a continuous line which is passed through the curling machine where the products are finished with up to 6 brushes covered with different silicon carbide coatings. Products which have already been ground and shot-blasted or even unfinished products are cleaned of residual cement by the brushes which also expose and polish the grains. This process gives the blocks a light glaze with a velvety surface which is nevertheless still slip resistant. After this, the layers are separated again and picked up by the separate layer transfer device D and placed on empty pallets. A pallet circulator, part of which is under the floor, conveys the empty pallets arriving from the external feed to the respective loading positions. At the loading position for ground or ground-shot-blasted-curling or just shot-blasted-curling products there is a net insert or film insert to protect the individual layers of blocks from damage. After the pallets have been loaded, a chain conveyor transports them to the cubing line.

All the bypass finishing lines of the installation can also process products which have not arrived directly from the Hess production machine. For this purpose, three roller conveyors take products on pallets to the finishing machines from outside. The loaded pallets then stand in the unloading position under transfer device B and one of the transport carriages W2-W4 removes the block layers from the block package with 4 clamps and conveys them to the finishing line concerned. A pallet lowerator transfers the empty pallets to the underfloor empty-pallet conveyor. Buffer magazines stack or destack up to 10 empty pallets from the empty-pallet circulator or accept pallet stacks from the forklift truck. Transport carriages 1 and 2 of transfer device C (see sketch) can pack products from each bypass finishing line on empty pallets.

Antiquing line

Like all bypass finishing lines, the antiquing line is supplied by transport carriage W2 or W3 of transfer device B. One of the transport carriages transfers the layers, which are either removed from the pallet or arrive indirectly from it, to the Kantiker scraper floor conveyor which then conveys the products to Kantiker 1 or 2 of the antiquing line where 2 layers are antiqued simultaneously on 2 vibrating tables featuring 2 high-performance vibrators each. If necessary, both Kantikers can be expanded by one antiquing unit with vibrating table each in order to increase the processing speed. The vibrations produced on the tables cause the products to be thrown



Layer conveyor for the shot-blasting machine



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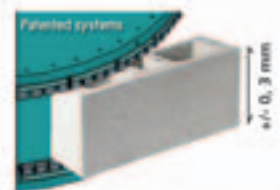
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against the tools which are suspended freely on tubes in longitudinal holes. The load-bearing supports of the tools oscillate in 2 directions. The combination of oscillations, vibrations and freely mounted tools allows the products to bump against each other and the tools so that the product edges are broken unevenly.

After processing in the first Kantiker, the products can be rotated 180° by a layer turner in order to be processed in the second Kantiker as already described. In this way, it is possible to antique both the top and bottom surfaces. If only one side of the product is to be processed, the block layers pass through the turner without rotation and are antiqued in the second Kantiker again on that side which has already been processed. In this case, the antiquing can

be performed more quickly since the edges are broken twice. The noise is reduced and production is monitored unimpeded by processing the products in sound-proof chambers fastened to the hall floor and fitted with sliding doors and viewing windows. As with all these other processes which produce dust, a sintered lamellar system collects the dusts for reuse in the concrete mix.

Antiqued or bush-hammered blocks in split condition are ideal for use as rustic masonry blocks. It therefore obviously makes sense to pass these products through the splitting line or to transfer split products to the antiquing machine for further processing. Transfer device C of transport carriage 1 or 2 transfers the layers to the discharge position of the respective line and places them on a conveyor belt which returns the products layer-by-layer to transfer device B where transport carriage W3 or W4 takes the individual layers and moves them to the feed position of the splitting or antiquing line.

Splitting line

On the splitting line, the layers are split in the first splitter in sequence or individually by means of the layer pusher and distance measurement system. The splitting waste falls through a waste flap onto waste conveyor belts which convey both the split waste and the waste produced by the Kantiker and the bush-hammering machine to a waste collection belt which discharges all the waste into a container. After the first splitting, a layer pusher pushes the rows of blocks as a block layer onto a 90° turntable where they are rotated and another pusher pushes them from the turntable into the second splitter row-by-row or individually. After the second splitting, the last layer pusher on the line arranges the products into block layers again and passes the layers to a belt conveyor which takes the them to the position where they are collected by transfer device C. Transport carriage 1 or 2 then takes the layers to the next pallet loading position to a waiting empty pallet.

Bush-hammering line

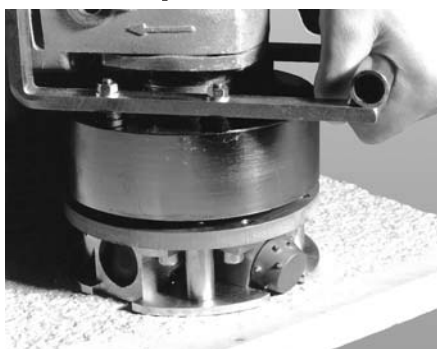
The last bypass line of the installation is the bush-hammering line. This line is essentially made up of already existing SR Schindler machines. Kilsaran purchased the bush-hammering line in 2004. It was dismantled again, adapted to the new conditions and integrated into the new installation. The bush-hammering line consists of the existing layer pushers and layer separators, the Mega 6000 B DUO bush-hammering machine with a working width of 1,050 mm, 2 bush-hammering units, a dust extraction system and belt conveyor for conveying the layers to the collection position of transfer device C.

All the processed block layers are stacked on pallets to form block packs and then conveyed to the packaging line where the packs are strapped horizontally several times, provided with packaging leaflets and then covered with covering film. The packs are then strapped again horizontally and vertically. Finally, the completed packs are transported outside on a pallet roller conveyor where they are collected by forklift trucks.

Each of the finishing lines described, the empty-pallet circulator and the packaging machine are provided with their own controllers. All part lines are also controlled and monitored automatically from a control centre. The control cabinets are housed in separate air-conditioned rooms which stand on platforms above the installation. Safe access to all the individual lines is made possible via staircases and platforms above the entire finishing installation. The entire installation is equipped with safety fences and safety doors accor-

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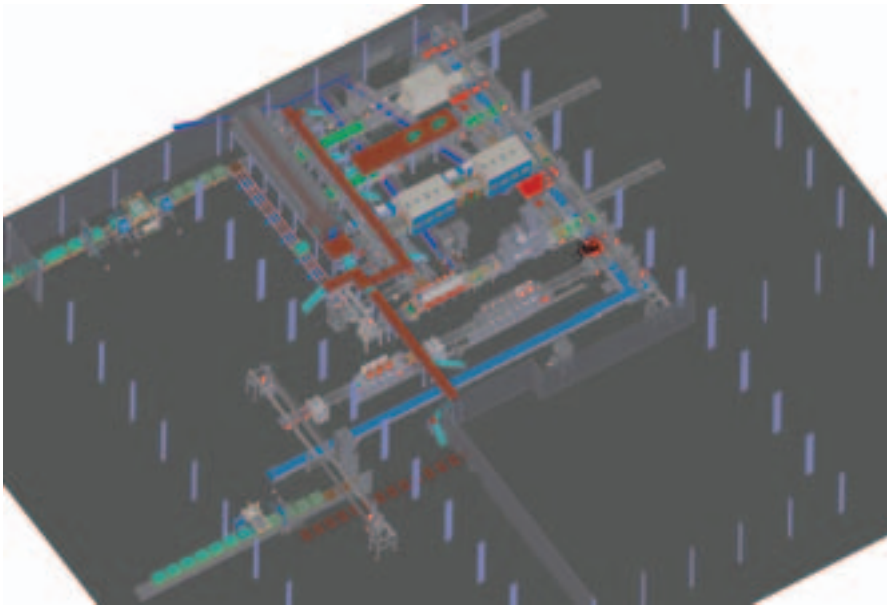
Roughing up stone surfaces evenly can be made into child's play. Besides marble, granite and sandstone, terrazzo or concrete can be processed too. Adjustments can be made to bush hammer width and degree of roughness. Even **arched surfaces** can be treated.

Typical areas of application are: **anti-skid strips on stairways, ground surfaces** in the open air...but there are no limits to your creative imagination.

As a general rule, the bush hammer attachment can be used with any commercially available **angle polisher**. However, it can also be fitted to an **edge polishing machine**.

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Building and commissioning the complex installation was made considerably easier by using 3D plans

ding to the current safety regulations. In the area of the transfer devices with several transport carriages, the individual danger areas have been cordoned off so that when the safety door is open, only the area concerned is shut down without blocking the movement range of the other transport carriages.

The versatility and complexity of the Kilsaran installation is impressive. At full capacity, the installation can process up to three different products in different ways simultaneously and then pack them.

Indeed, it is still possible to add an impregnation machine after the shot-blasting curving line.

With this installation, Kilsaran can meet all the current and future market requirements. At the same time, housing the complete solution in one hall simplifies logistics and reduces personnel requirements.

FURTHER INFORMATION



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