

SR-Schindler Maschinen-Anlagentechnik GmbH, 93057 Regensburg, Germany

New finishing line at Tobermore in Northern Ireland

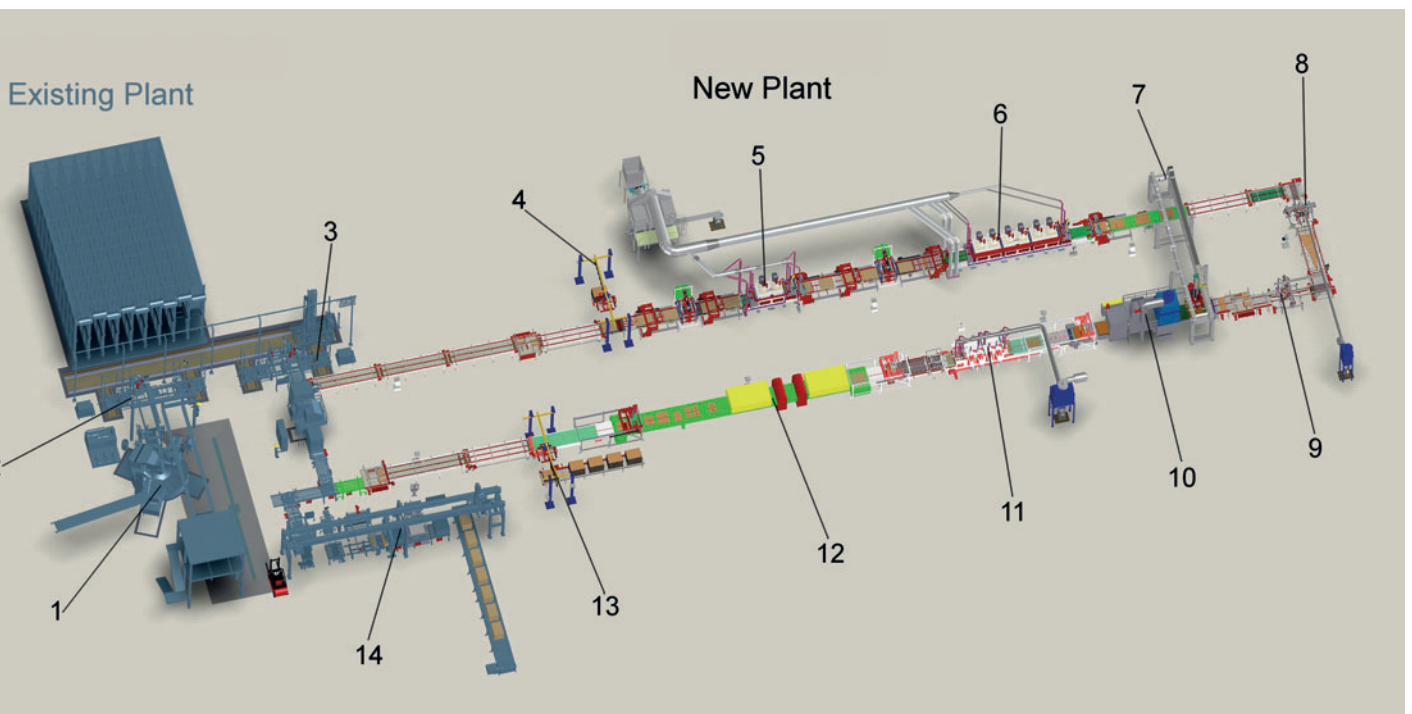
In late July 2016 Tobermore ordered a finishing line for paving stones and hermetic slabs from SR-Schindler. The plant was delivered in late May 2017 and went into operation in September/October. Tobermore had already purchased a 1200-tonne hermetic press with horizontal depositing device, a shotblasting line and an on-edge packing from SR-Schindler in 2009. At that time the plant had already been designed such that the hardened slabs were placed by the slab transfer device of the dry-side horizontal depositing device onto a roller conveyor with an angular transfer unit. In the first stage of expansion the slabs were then conveyed in a straight line into the shotblasting plant. In the present second stage of expansion the slabs are moved by means of the angular transfer unit diagonally into the new finishing line.

The line is executed in U shape. The calibration/grinding line is designed for a working width of 900 mm, the blasting/curling line for a working width of 1200 mm. All hermetic slab for-

mats and paving layers that Tobermore produces can thus be machined. In the implementation of the handling and conveying equipment, particular attention was paid to the fact that the hermetic slabs have no spacers and therefore have to be transported very gently to avoid damage to the edges and spalling.

A belt conveyor initially transports the hermetic slabs in a single row, one behind the other, so that faulty products can easily be sorted out. Following the inspection section and the regrouping unit the slabs are transported onwards in pairs (always two slabs alongside each other) by belt conveyors and layer pushers to the drum turner. On the conveying section, which is slewable to enable access to the line, paving layers from the external storage area can be inserted by a bridge crane with a pneumatic 4-sided clamp.

In the hydraulic drum turner, which has pneumatic lateral guides to facilitate adjustment to different product widths, the



The finishing line at Tobermore has a U shape: 1 Hermetic press, 2 Horizontal depositing device on wet side, 3 Horizontal depositing device on dry side, 4 Paving input with crane, 5 Calibration, 6 Grinding, 7 Transfer device, 8 Chamfering 1, 9 Chamfering 2, 10 Shotblasting, 11 Curling, 12 Coating, 13 Paving output with crane, 14 On-edge packing



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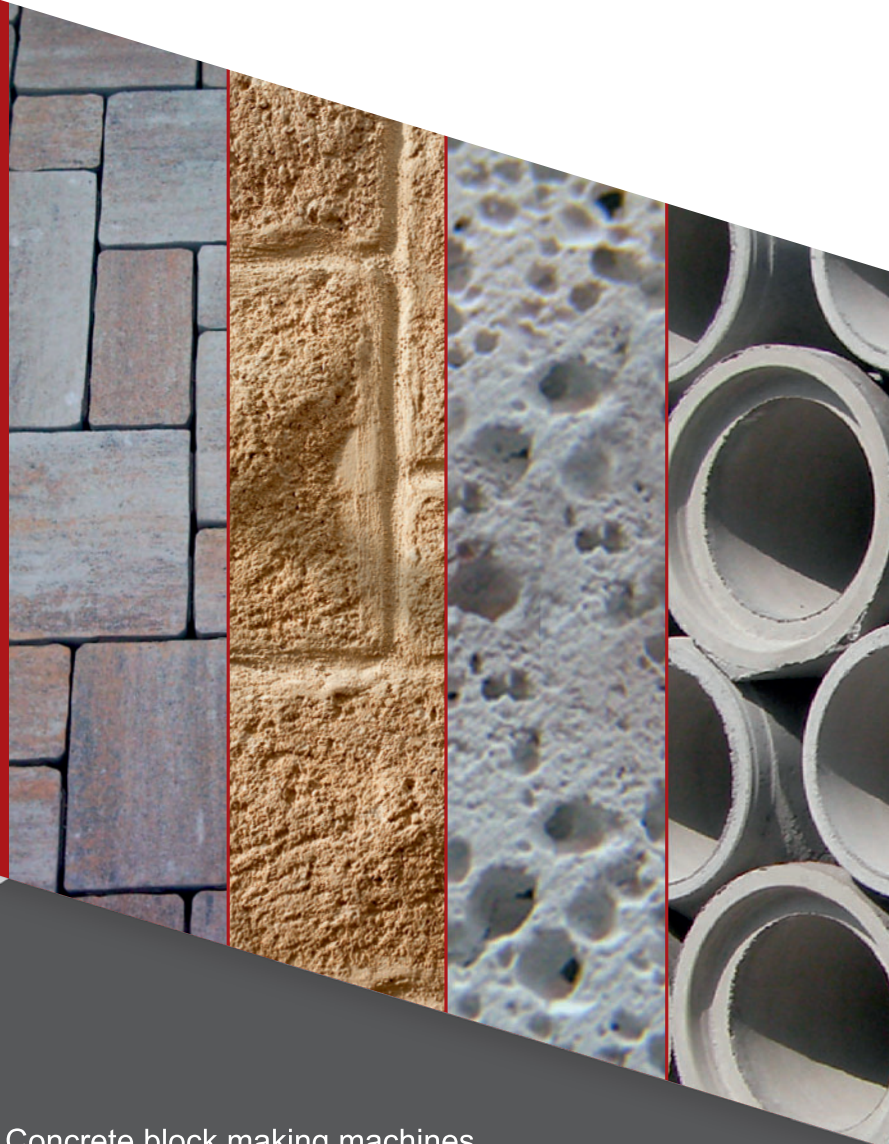
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The calibrating machine with two stations operates in dry mode

products are turned by 180° from the facing side onto the base-mix side and subsequently conveyed in an endless line into the calibrating machine. The calibrating machine with two stations operates in dry mode. The calibration takes place with diamond milling segments in dovetail guides that allow fast tool changes. The holding plates for the tools are universal, allowing also the use of both smoothing and grinding segments. The motors for the machining and height adjustment are frequency controlled. The lateral guides in the calibrating machine can be adjusted electrically to the respective product width in inching operation.

Following the calibration, roller conveyors and layer pushers transport the products to the second drum turner. Both the drum turner and the roller conveyors are equipped with rubberised rollers so that the facing side is not damaged during transport.

The drum turner turns the products over again by 180° and the workpieces move with the facing side on top into the grinding machine, which also operates in dry mode. The machining takes place with six universal stations with frequency controlled motors for the machining and height adjustment. In the grinding machine, too, the lateral guides can be adjusted electrically to different product widths in inching operation. The bed of the grinding machine has been extended so that two grinding stations can be retrofitted at a later date if necessary.

The dust extraction system from Donaldson for the calibration and grinding machine is designed for a flow rate of 40,000 m³ and is equipped with a clean air return package, thus eliminating the need for pipework to the outside of the building.

The ground products can now either be transported onwards to the chamfering unit or placed in layers onto the blasting/curling line situated opposite by a layer transfer device with electrical 4-sided clamp. The clamp is designed so that a vacuum suction plate can be used if necessary in order to be able to move thin slabs in layers.

Products that are to be chamfered are separated by an angular transfer device so that the slabs pass through chamfering machine 1 with a working width of 1,200 mm. Chamfers are applied to the product on the left and right sides with a chamfer milling support. The width of the chamfer can be set by manually adjusting the milling supports. The coarse adjust-



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The drum turner turns the products over again by 180° and the workpieces move with the facing side on top into the grinding machine.



Layer transfer device with electrical 4-sided clamp

ment of the product height is done mechanically, while the fine adjustment is achieved by means of weighted feeler rollers that run on the surface of the product. Height differences between the slabs are compensated by means of parallelogram guidance between the feeler rollers and the miller. A further angular transfer device rotates the products by 90° so that the two remaining edges of the product can be machined in chamfering machine 2 with a working width of 1,000 mm.

Two lateral milling supports can be retrofitted to both chamfering machines for trimming (partial milling of the spacers). The chamfering unit also operates in dry mode. Dust extraction is accomplished here, too, by a Donaldson filter system with clean air return package.

Before the subsequent processing in the shot blasting machine, the individual products running behind one another are once again grouped into pairs in order to utilise the working width of the blasting machine to the maximum.

In the shot blasting machine the products are machined in layers spaced at least 600 mm apart with abrasives propelled by two turbines rated at 18.5 KW each. The distance between the layers ensures that they are not over-blasted when the system stops and that the abrasives still falling down when the turbines stop fall through the perforated conveyor belt into the screw conveyor and can be cleaned and transported back into the material silo. A Donaldson filter system is mounted directly on the shot blasting machine.

At the outlet of the shot blasting machine the individual layers are formed into an endless line by layer pushers and accumulating roller conveyors. The endless line is necessary because the contact pressure of the curling brushes is controlled by the current consumption. The rollers therefore always have to remain in contact with the product surface.

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THE RESULT:

A high block quality with a perfect surface.





In the shot blasting machine the products are machined in layers spaced at least 600 mm apart with abrasives propelled by two turbines rated at 18.5 KW each



In the curling machine, too, the lateral guides are adjustable electrically to different product widths in inching operation.

The curling machine is equipped with two processing tunnels, each with two brush rollers, and has been configured so that two further brush rollers can be retrofitted. The brushes are suspended with an inclination of about 5°. Brushes 1 and 3 run in the opposite direction to brushes 2 and 4. Due to this counter-rotating processing, line traces of the brushes on the surface are avoided.

In the curling machine, too, the lateral guides are adjustable electrically to different product widths in inching operation. High pressure cleaning ensures largely dust-free products in the coating.

Following curling the stones pass through the quality control. The endless line is broken up here by means of an accumulating roller conveyor so that the operator can easily remove seconds and replace them by perfect products. A layer pusher then transfers the products in layers to the customer's coating line.

The refined and coated products are transported by means of a belt conveyor to the existing on-edge cuber. Prior to cubing the hermetic slabs, which had up to now passed through the shot blasting and curling machines in two rows side-by-side, are regrouped into a single line of slabs running one behind the other.

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The paving layers are manually removed before this regrouping unit by means of a crane with a 4-sided clamp and placed in layers on wooden pallets. The loaded wooden pallets are transported by a heavy-duty roller conveyor to the removal position.

The entire plant has six single Siemens S7 controllers in a total of 16 control cabinets and a central control centre controller. The plant is operated over WLAN by means of two mobile industrial Tablet PCs with touch screen and 3D visualisation.

All S7 controllers are networked with the control centre controller over Ethernet. All production data (shift output, malfunctions, interruptions, etc.) can be collected and prepared via the network and the entire plant can be adjusted centrally to the respective product to be refined. All production parameters can be stored by a recipe management system and reloaded as necessary.

Remote maintenance is possible via the customer's Internet connection by means of a VPN router installed in the control cabinet.

The safety installations were planned by SR-Schindler, who also supplied and mounted the electrical components. The safety PLC was programmed by SR-Schindler. The mechanical safety installations were provided by Tobermore according to the SR-Schindler safety concept.

The products produced with the new finishing line are presented in the current Tobermore brochure and will go on sale in spring 2018. ■

FURTHER INFORMATION

TOPWERK

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