

SR Schindler, 93057 Regensburg, Germany

New slab production with hermetic press and value-adding line at Tobermore in Northern Ireland

With a company history of 80 years and diversification in the manufacture of concrete products in the 1950s, Tobermore is now one of the leading manufacturers of paving stones and walls in the UK and Ireland, meeting the needs of private users as well as architects and large construction companies. To meet its customers' increasing demand, at the beginning of 2021, Managing Director David Henderson, awarded "Industry Entrepreneur of the Year" in November of the same year, decided to expand production. Due to the high level of satisfaction with SR Schindler machines already in use, the company decided to purchase SR Schindler equipment again.

This site consists of a hermetic press with six stations for slab production and a finishing-packaging line with the subsections "shotblasting" and "packaging", the latter including a cover foil dispenser as well as vertical and horizontal strapping.

Tobermore opted for the UNI 1200/6 hermetic press with six working stations to produce double-layer concrete slabs. The enclosed main pressing station is designed with a max. pressure of 12,000 kN. The turntable of this hermetic press automatically rotates one station further after the work has been completed at the respective station.

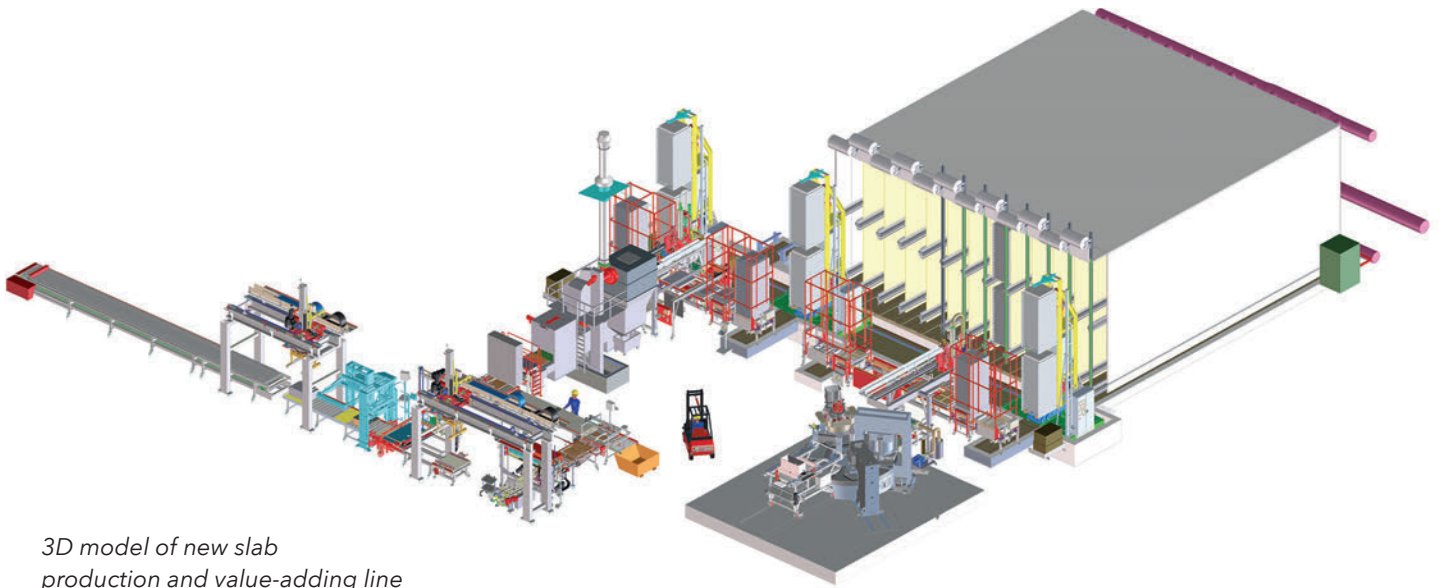
The low wear, as well as the easy maintenance and control of the machine, are the significant advantages that the UNI hermetic press offers to the customer.

Hermetic press UNI 1200/6

At the beginning of the first station, the liquid facemix gets automatically filled into the mould/moulds of the mould table and then evenly distributed in the second station. In the third station, the filling pocket of the backmix feeder, which is equipped with programmable parameters, a controlled flap



The Tobermore plant in Northern Ireland



3D model of new slab production and value-adding line

on the feed hopper and a movable conveyor, moves to the edge of the mould/moulds and distributes the first layer of earth-moist backmix concrete directly on the facemix. During the backward movement, the mould/moulds are now further filled. To obtain a uniform slab thickness, a freely programmable overfilling curve during the backward movement can

be controlled using an X-Y axis regulation, which determines the thickness of the end products. The filling pocket is frequency-controlled, and the possible overfilling is electrically controlled via linear cylinders. At the same time, the mould table are cleaned from above using a pneumatic scraper.



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Tobermore opted for the UNI 1200/6 hermetic press with six working stations to produce double-layer concrete slabs.

At the hydraulic prepressing Station IV, the facemix and the backmix are finally pre-compacted with max pressure. 800 kN and the water exchange between them is initiated. This process can shorten the time of the main pressing. At the main pressing station, the facemix and the backmix are compacted hydraulically with a max. pressure of 12,000 kN, whereby the pressing force is stepless adjustable for each format and is automatically switched off when the required force is reached. Furthermore, the immersion depth of the press stamp is electronically monitored by a linear encoder. At the last station, the slabs are hydraulically ejected. First, the mould frame is raised pneumatically, whereby the lifting speed can be set manually using a valve. Next, the slab carriage moves below the mould/moulds, on which the green slabs are pushed downwards by the hydraulic ejection device.

The significant customer advantage is the single mould triggering, which allows one or two moulds to be left unfilled. This enables the production of samples as well as 1st choice products on 4-5 stations, in case rubber matrices are worn at one or two stations.

The automatic facemix doser system for volumetric dosing of facemix and for filling the mould/moulds is mounted on a quick exchange column.

Using the new, electrically height-adjustable and swivelling doser column, the facemix doser, designed as a disc doser for Tobermore, can be swivelled into the desired position. The doser can be adjusted in the vertical direction using the lifting motor and is attached to the docking plate. Three different lifting heights can be set using limit switches attached to the lifting column.

Advantages of this doser column are the easy change of the doser unit for cleaning and maintenance purposes as well as the easier mould change. The mechanical quick-change device allows a safe and timesaving change of the doser unit by forklift.

Both dosing discs of the facemix doser are moved apart and towards using two pneumatic cylinders. Thus, a tight lock is granted. The material ejection pneumatically supported is nearly drip-free. All six working stations of the press are controlled by Siemens PLC S7-1500 and a Profinet system via an operating panel with visualisation.

Given the wide range of formats that can be produced with a UNI Hermetic press, Tobermore opted for 450 x 450 mm, 4-fold with a slab thickness of 35 mm, and 400 x 600 mm 2-fold with a slab thickness of 50 mm.

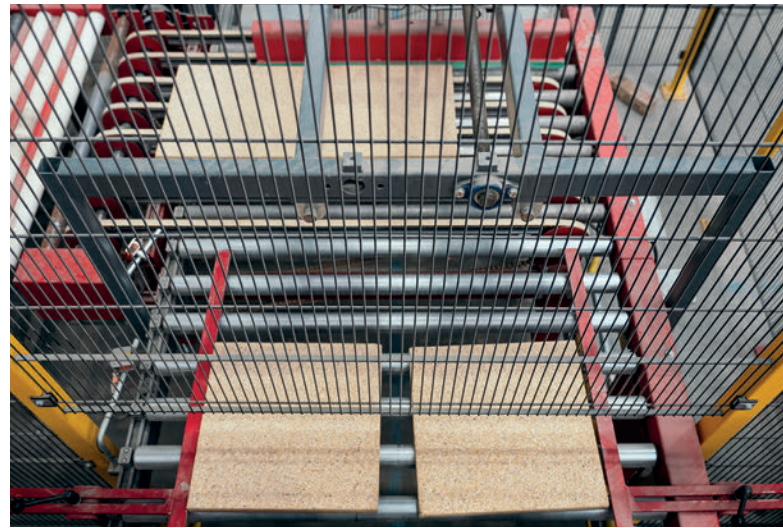
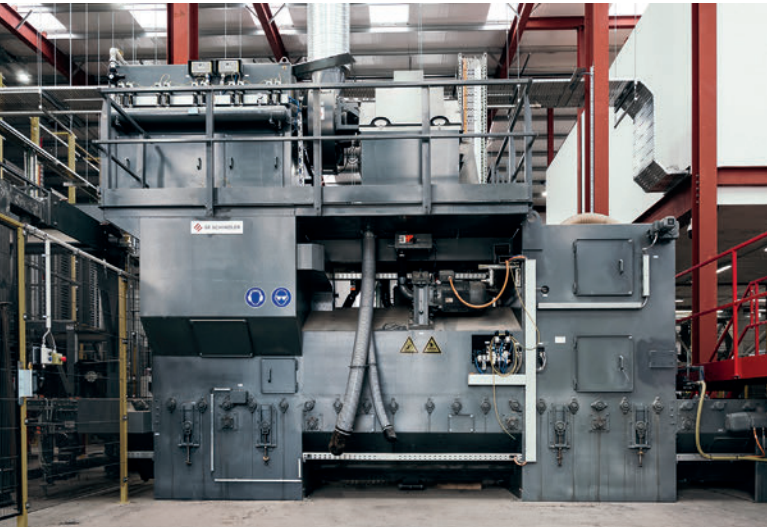
Removing slabs from the hermetic press

The slabs ejected onto the slab carriage are then taken off by a vacuum lifter, turned by 180° using the green slab turning device SR-1200, and transferred from the vacuum transfer unit to the subsequent flat depositing device. The vacuum transfer device deposits the green slabs on galvanized steel pallets, which are destacked, transported, and again stacked on the flat depositing device wet-side Syncro 2000 with eight stations.

The pallet stacks, filled with green slabs, are transferred to the curing chamber using a fully automatic finger car. At the end of the curing process, the pallet towers are transported by the automatic finger car to the flat depositing device Syncro 2000 dry-side with six stations and get separated into the individual pallets.

The vacuum transfer device of the flat depositing device dry-side with a universal suction device removes the cured slabs and puts them down on the conveyor of the value-adding line.

The control of the green tile turning device, the flat depositing devices, and the slab transfer device are controlled by CPU S7-1500 and is equipped with operational panels with visualisation for all operating controls.



The products pass the shotblaster SR-1250, which is equipped with two frequency-controlled turbines, each with 18.5 kW electric performance.

The automatic finger car with a 180° rotating device transports the pallet stacks filled with green slabs to the storage position and the pallet stacks filled with dried slabs from the storage position to the flat depositing device dry-side. Furthermore, it transports empty pallet stacks to the flat depositing device wet-side or to the storage device.

The customer-provided curing chamber consists of 12 individual chambers, including two empty chambers. Each chamber has 12 storing positions with two pallet stacks on top of each other. Per pallet stack, up to 25 pallets are possible. Therefore, Tobermore has space for a total of 6,000 pallets.

Value adding line

A roller conveyor feeds in the slabs produced by the hermetic press UNI 1200/6 into the value-adding line.

First, the products pass the shotblaster SR-1250, which is equipped with two frequency-controlled turbines, each with 18.5 kW electric performance.

For this purpose, the products to be shotblasted are transferred from the roller conveyor to the frequency-controlled rubber transport belt with transverse ribs of the shotblaster and transported to the blast chamber, where the products are processed by 0.6 - 0.8 mm solid or stainless steel balls.

A high-pressure blower removes the abrasive remaining on the product surface. The contaminated abrasive is transported, cleaned and subsequently fed to a new shotblasting process.

The shotblaster is controlled by a Siemens CPU S7-1500 with a Profinet bus system and Touch Panel KTP 700.



Shotblasted products

The fine dust produced during the shotblasting process is extracted by a cartridge filter Type A 40/16 mounted directly on the shotblaster. The rough particles are collected in a hopper and fed into a movable steel container. The customer carried the piping from the cartridge filter to the outside area.

Then the shotblasted products are controlled for quality on the approx. seven meters long roller conveyor. Starting there, the products are transported over an angular transfer device to the approx. four meters long retarding chain conveyor with double lifting table for correct positioning of the slabs below the take-off position of the vertical tile depositing device.

The following tile packing unit PA77-DUO puts the slabs vertically and, depending on the format, next to each other or behind the other on the retarding chain conveyor.

The slab packages are then deposited on the roller conveyor by the travelling trolley of the first package and layer stacking device LPU 933. The roller conveyor transfers the packages to a transport carriage, which moves the packages under the cover foil dispenser. Subsequently, the slab packages are transported on another roller conveyor through the vertical and horizontal strapping. The travelling trolley of the second LPU now takes the strapped packages and sets them on an approx. 17 meters long slat conveyor for removal by forklift. To save time, two LPUs are used.

Both identically executed travelling trolleys - each equipped with a moving frame with electric drive via a toothed belt for horizontal movement and vertical stroke - are frequency-controlled with a smooth start and stop. Furthermore, the travelling trolleys are executed, each with a two-sided hydraulic clamp, incl. hydraulic aggregate, a fall arresting device as well as a turning device 270°. The 270° turning device positions according to the degree selected, up to 270° (-90° and +180°) and is driven by a frequency-controlled gear motor.

The cover foil dispenser can apply a cover foil with a max. width of 1.5 meters and max. length of 1.8 meters. The media length is detected via an incremental decoder and the foil is cut by a rotation knife guided horizontally using a belt cylinder.

Siemens S7-1500 with tablet PCs electrically controls the value-adding and packaging lines.

In addition to that control, Tobermore opted for the central B&B operating and monitoring system - consisting of 1 PC and five mobile tablet PCs with visualisation. The tablet PCs are linked via WIFI with all relevant TIA controls. By linkage, relevant information like interruptions, output per shift, breakdown, etc., get collected and prepared for further processing. This way, the complete line can be adapted to the individual product type to be treated and packed. The B&B software and hardware replace all wired control devices.

Advantages of the central operating and monitoring system are, among other things, the uniform operating concept, the graphic overview of the status of the safety devices, the clear

display of faults and interruptions, the program management for all machines of that line, the recording of operating data, the runtime recording as well as the user administration with access hierarchy to protect sensitive data from unauthorized access. Besides, the central operating and monitoring system allows dividing the entire system into system parts with their controller and CPU. This makes it possible to exchange even bigger amounts of data with one another, reach all controls via the visualisation system, and perform programming and troubleshooting with the programming device centrally from one place or via WIFI.

Furthermore, the remote maintenance system can reach all the system's control from one point via the Internet. All control panels are networked via Ethernet, allowing you to access all controls from just one control panel.

Both the mechanical and the electrical safety of the slab production and the value-adding line, as well as the assembly and commissioning, fall under the responsibility of SR Schindler.

"We are very proud to be able to implement this major project together with SR Schindler, which will enable us to continue offering the best selection of a wide variety of products to our customers," - said Trevor Smyth, plant manager. ■



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