

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

# Fully Automated Wetcast Line with Robot Flat and On Edge Packing

Since March 2011 Kilsaran in Irland produce paving stones, tiles, kerbstones and a lot more in fully automatic wetcast mode with a SR Schindler line. The plant is executed for pallet size 920 x 1500 mm and max. mould size 840 x 1420 mm. Max. producible product size is 800 x 1350 mm. Kilsaran uses flexible WASA PU moulds and rigid ABS moulds from local supplier. Production cycle is 16 – 30 seconds depending on the mould and format to be produced. In total the plant consists of 14 stations with 3 empty stations at position 3, 5 and 7 which can be used for manual demoulding, respectively manual mould filling for special products and manual cleaning.

The plant combines wet and dry side by means of a continuous pallet transport system. A finger car removes the pallets with moulds filled with cured products as a pallet tower (14 pallets stacked on each other) from the curing chamber and transfers the tower to the pallet transport system of the wetcast line. By means of hydraulic lifting/lowering station the pallets get singulated and transported via horizontal and electromotive driven transport sledge to the demoulding station. For demoulding the pallets with the moulds get hydraulically lifted and fixed by means of vacuum. A cuber with horizontally moveable carriage equipped with vacuum suction plate sucks in the cured products and pulls them out of the mould via pneumatic lifting. The horizontally moveable carriage is driven by servo motor for precise positioning and for adjustment to the different moulds. The suction cups of the suction unit are universally applicable and have to be exchanged only for the smallest format 100x100 mm Kilsaran is producing.

Before demoulding the products get loosened via vibration for easier demoulding. During this predemoulding a mechanical downholder holds down the mould on the pallet, the pallet gets lifted and vibration starts. The demoulded products get deposited on a belt conveyor.

The emptied mould gets transported to the cleaning station where the pallet with empty mould gets electromotorically turned by 180° and cleaned on a separate vibration table. The pallet with the cleaned and empty mould gets returned to the pallet transport system and transported to the oiling station.

4 pneumatically swivelling automatic spraying devices spray the release agent as atomized mist in the individual compartments of the mould. Then transport to the dosing station continues.

In relation to the mould and its individual compartments the liquid concrete mixture

gets filled in one or more dosing cycles in the compartments. The filling gets done by means of Smartdoser, a patented dosing unit which fills highly flexible, accurately and within seconds different volumes by means of 6 linearly arranged dosing bushes in the material chutes.

For the filling process a pneumatic transportation carriage moves the mould in accordance with the mould geometry (number and position of the compartments) under the material chutes. With completion of the mould filling the transportation carriage lowers and the mould transport to the 2 vibration stations goes on. For pore free texture of the liquid concrete the pallets with the filled moulds get lifted again and fixed by vacuum. The vibration by means of electromotoric vibrators starts.

Afterwards the pallets get stacked again and the finger car picks up the pallet tower for transport to the curing chamber.

For production of bi-color products a separate coloring device was delivered. The device equipped with 2 containers for liquid color, pumps and nozzles sprays the color in the liquid concrete before it gets filled in the mould. The nozzles are mounted inside the material container of the dosing unit and spray the color with the rotation of the stirring shovels in the mixture.

For packing a belt conveyor transports the demoulded products to the drum turning device for 180° turning that the product face shows upwards for visual control by operator. 2nd choice products get exchanged manually.

The following flat or on edge packing is format related. For on edge packing a Fanuc robot takes off the products individually after quality control and puts them on a pallet which gets fed from an empty pallet magazine and transported by a roller conveyor to the loading position. For stable



Fingercar with pallet stack



Demoulding device



Demoulded products deposited on belt



*Fanuc robot takes off the products individually after quality control*

packing of the products in an upright position a wooden chock transported by a chain conveyor to the loading position gets put on the pallet by robot. Only then the robot deposits the products on the pallet. That way 2 product packs – one left and the other right of the chock – are on the pallet then.

For flat packing product layers get pushed and if need be rearranged by layer pusher on a take off table where the robot picks them up.

Upon flat and on edge packing a vacuum suction plate mounted at the robot wrist is used.

Once the pallet is fully loaded a heavy load roller conveyor transports it to a carriage running on rails. The carriage transfers the pallet to a further heavy load roller conveyor for transport to the pick-up position by forklift.

The heart of the plant is the patented volumetric Smartdoser. The doser consists of a base frame with guiding rails, a horizontally moveable carriage running in the guiding rails, height adjustment, stirring device with material container and the dosing unit. The carriage can be moved either in working or in cleaning position.



*Upon flat and on edge packing a vacuum suction plate mounted at the robot wrist is used.*

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The heart of the plant is the patented volumetric Smartdoser



Ball dispenser

For the filling process the concrete mixture gets transported by a belt conveyor to the material container of the doser. The permanently running stirring device in the material container keeps the concrete in motion and prevents it from sticking at the container wall. A laser filling level control sends a signal for further concrete supply. The bottom of the material container has 6 linearly arranged openings. Concrete drops through these openings in 6 dosing bushes also arranged in a line. The dosing bushes are split in inner and outer bush. According to volume requirements the 2 bushes move apart (bigger volume) or into each other (smaller volume) by means of lifting or lowering of the dosing unit. That way the volume can be

changed quickly and accurately. Height adjustment and volume dosing get done by means of 2 independent motors with frequency converter each which are synchronized with each other via master - slave. As soon as all bushes, respectively the bushes necessary for the volume requirement are filled - bushes can also be deactivated - they get transported by a hydraulically driven sliding mechanism consisting of 6 individually driven sliders to the openings of 6 material chutes. The concrete mixture drops from the bushes in the chutes. Filling capacity per bush variable from 0.5 - 2.5 ltr. The material chutes are rotary and swivelling for a well-directed filling of the mould compartments.



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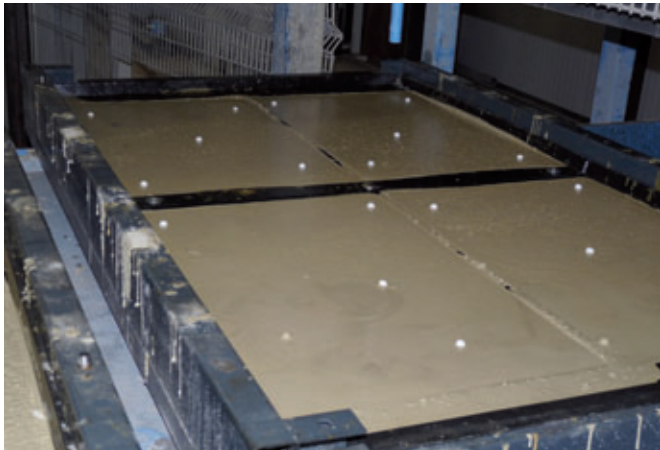


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Products with balls

After the doser a ball dispenser is mounted. It feeds tiny plastic balls from a hopper by means of pneumatic cylinders and air tubes to the shooting tool of the robot. The robot moves well-directed and format related to the individual dropping position – per tile one ball in every corner – and drops the ball. Due to the following vibration the balls sink up to the middle in the concrete mixture and serve as surface protection upon packing.

Due to the highly flexible and accurate dosing the line works fully automatically. Manual distribution of concrete to compensate different filling heights is even with small and different formats within one mould not necessary. Filling accuracy is approx. 1 mm.

The line copes with the requirements of an economic mass production as well as with the demands of individual production and opens thanks to the revolutionary dosing technology new cost saving ways in the wetcast production. Per shift the line is operated by 2 people – one responsible for batching plant and wetcast line and the other for quality control.

For the control of the plant an IPC based line monitoring and operating unit is used which grants a fast and fully automated format change. The control allows up to 8 dosing positions per mould. Per dosing position of the lifting carriage are up to 5 dosing cycles according to the volume requirement possible. For every dosing cycle the dosing volume can be newly defined and the number of dosing bushes in operation can be selected.

FURTHER INFORMATION



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