

Weckenmann Anlagentechnik GmbH+Co.KG, 72358 Dormettingen, Germany

Plant extension successfully put into operation

In 2017 the Jakarta-based company PT. Rekagunatek Persada, a subsidiary of Indopora PT. Indonesia Pondasi Raya, put a central transfer table system from Weckenmann Anlagentechnik GmbH & Co. KG for the manufacture of wall and façade elements into operation. The master plan for the development of the newly erected production facility foresaw the construction of an additional production plant for the manufacture of prestressed floor slabs as a further development step.

The choice of planning partner and plant supplier fell once again on Weckenmann Anlagentechnik GmbH & Co. KG, one of the internationally leading plant suppliers in the field of precast concrete element manufacturing, which is represented in Indonesia by PT Melindo Dipta, a Melchers group company.

Together with the customer, Weckenmann Anlagentechnik GmbH & Co. KG planned the next stage of development - a plant for the manufacture of prestressed solid slabs. The result was a stationary production concept comprising a total of six production lines, each 120 metres in length.

The second construction phase of the production facility went into operation in summer 2018.

This comprises the following individual components:

- six production lines, each 120 metres long, with prestressing units
- two half-gantry concrete spreaders
- two utility carts
- a run-off truck
- a central bucket conveyor
- a cleaning and spraying system
- a sawing system for prestressing wires
- a complete shuttering system for three different manufacturing heights

The new floor slab manufacturing plant offers the possibility to manufacture prestressed solid slabs with a manufacturing width of maximally 2,400 mm. The production lines offer the possibility to manufacture surfaces in fair-faced concrete quality. The formwork surfaces are precisely even and finely polished by machine.



Six production lines arranged in parallel with a central logistics aisle.

Shuttering system

The load capacity of the production lines of 500 kg/m² allows precast concrete elements of up to 200 mm in thickness to be manufactured. The element thicknesses were set to 65 mm, 80 mm and 120 mm for the time being, for which the shuttering system was designed.

The lateral shutters of the production lines can be folded down for prestressing and the easy demoulding of the elements. In addition, they are exchangeable to allow the fast

change of the production thickness or the casting joint contour. A new, ergonomically easy to handle shuttering system was developed for this that offers the possibility to quickly replace the respective lateral shuttering plates by a different version using a quick-change device.

Proven prestressing technology

The prestressing unit for the tensioning of the tensioning strands consists of tensioning abutments integrated into the building foundations on both sides at the ends of the produc-



Half-gantry concrete spreader with bucket conveyor during concrete transfer



Run-off truck with hydraulic lifting platform for taking up the floor slab stacks

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Cleaning and spraying system for release agent with tension bar for tensioning strands

tion lines with hydraulic detensioning cylinders on both sides of the production lines.

The prestressing unit is designed for a maximum prestressing force of 2,000 kN.

The prestressing wire coils are provided for the processing in strand reels.

The prestressing wire strands are fastened via deflecting rollers to a tension bar provided for this purpose on the cleaning and oiling machine and are extended by this machine together for each floor slab over the entire length of the production line and deposited on the production line.

The tensioning strands are prestressed by a single-strand prestressing jack, which prestresses them individually to the required tensioning force. The spacing of the tensioning strands is dictated by the individually drilled hole pattern of the cross hole plates of the prestressing facility on both sides of the production line.

The detensioning of the tensioning strands following the curing of the concrete takes place hydraulically and from both sides symmetrically by means of the detensioning cylinders of the prestressing unit.

Formwork systems

The X-Uni-S shuttering system was selected for the shuttering of the prestressed floor slabs as this system is very well suited to the existing protruding transverse reinforcement with different element thicknesses.

The longitudinal shuttering profiles are fixed by Magnet-Boxes, which can be fastened quickly by means of adaptors and bayonet locks.

The transverse shutters are slotted for the continuous tensioning strands, over which they are placed. For the detensioning of the parts the transverse shutters are resilient so that they can absorb the detensioning pressure. After curing they are stripped by means of special spreader bars above the utility cart.



Tensioning strand saw

There are two utility carts for the handling of the formwork and the buffering of the formwork profiles. These carts move along floor rails running parallel to the production lines and are equipped with magazines.

A handling crane is installed on each utility cart for the handling, which facilitates and accelerates the demoulding and shuttering.

Concrete distribution

The six production lines are concreted by two half-gantry concrete spreaders, each of which spans three production lines. The concrete distributor buckets are movable over all three production lines.

The container units each have a capacity of 3.0 m³ concrete and dose the concrete precisely and in the correct quantity via individual slide valves over a width of 1,200 mm.

Variable concrete dosing concept with lifting units

The discharge containers are rotatable by 90° for the optional manufacturing of prestressed beam elements on the production lines. As a result, the laminar discharge of the concrete spreaders becomes a linear discharge suitable for beam elements. Lifting units with a stroke of 1.00 m enable the discharge containers to be adjusted in height, which is necessary due to the shuttering structure for the manufacture of beam elements.

This allows, for example, driven piles or rod-shaped sheet pile elements to be manufactured on the production lines.

The two concrete spreaders process up to 180 m³ fresh concrete per shift.

In the course of the discharge of the concrete the concrete surface is levelled by means of height-adjustable, vibrating screeding beams.

Compaction takes place simultaneously with the concrete discharge by means of the compaction systems, which are also mounted on the concrete spreaders. These have seven high-frequency internal vibrators with a variable frequency setting that can be hydraulically dipped into the concrete.



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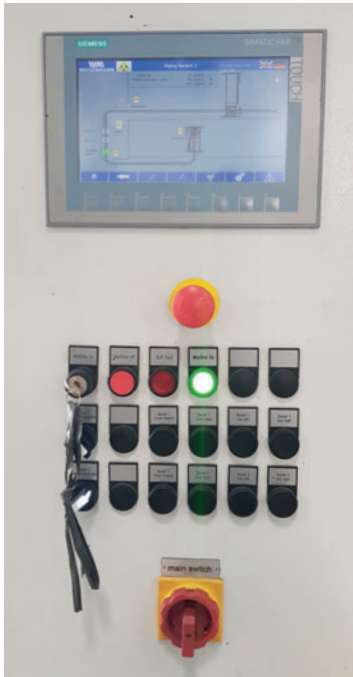
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Control panel of the communication controller for requesting concrete with process visualisation

The concrete spreaders are operated entirely via radio remote control.

Concrete supply by bucket conveyor

Concrete is supplied continuously from the mixing plant to the concrete distributors via the centrally installed bucket conveyor with two bucket tracks.

With a capacity of 2 m³ concrete each, the two bucket conveyors commute back and forth between the mixing plant and the concrete spreaders. The bucket conveyor follows the concrete spreaders via a tracking controller so that the concrete can be transferred with a minimum loss of time. Con-



Run-off truck with hydraulic lifting platform for taking up the floor slab stacks

crete is requested by the operator of the respective concrete spreader. The bucket conveyor controller exchanges signals with the mixing plant. The time-optimised provision of concrete is controlled in this way.

In preparation for the lifting of the floor slabs, the tensioning strands are cut by means of a tensioning strand saw. The sawing unit, which travels along the production lines, has an axis-controlled, fast-running saw blade, enabling a clean and fast cutting procedure.

After lifting, the finished elements are stacked on strip footings along the production line and subsequently taken to the storage yard. A rail-mounted run-off truck drives under the floor slab stack. Using a lifting platform, the truck can lift floor slab stacks weighing up to 30 t and transport them to the storage yard. This transport concept takes a load off the crane systems in the production hall, as only short distances need to be travelled by the cranes to form stacks.

Summary

A plant with a production capacity of up to 1,400 m² prestressed solid slabs per shift has been built here. It features a clever shuttering concept as well as advanced production logistics.

The mechanical equipment concept offers options to extend the product range towards rod-shaped element production.

A conscious decision was taken to do without complete production automation. The focus is on high product quality, combined with advanced production mechanisation.

Production ergonomics and high operational reliability are also at the focal point and contribute to the cost-effectiveness of the plant investment by PT. Rekagunatek Persada. ■

FURTHER INFORMATION



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