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New production line for customised special parts made from high-performance concrete

■ Mark Küppers, CPi worldwide, Germany

In Eggenstein-Leopoldshafen, Baden, Lithonplus manufactures customised special parts from high-performance concrete in a new plant area created specifically for this purpose. Prior to commissioning, the production line was rebuilt, for which the company invested several million in recent years. For this ambitious project, Lithonplus has consciously chosen the right partners and successfully realised it for concrete production with the three companies Teka, VHV Anlagenbau and Sauter. Each of them is regarded as a specialist in their field and was able to convince with an optimal project solution for Lithonplus. The design of the mixing, conveying and control technology is optimised for the production of high-performance architectural concretes: Precise mix development with optimum mixing results, especially when processing small quantities of self-compacting concrete for the factory.

Lithonplus GmbH & Co KG, based in Lingenfeld near Speyer, is one of the leading manufacturers in the field of concrete products. More than 600 employees work at 18 locations throughout Germany.

Lithonplus specialises in concrete products. With enthusiasm and passion, the company exploits the versatility of concrete as a building material and develops blocks, slabs and elements that shape the design of open spaces. Design and function go hand in hand. Lithonplus also promotes innovative and sustainable construction methods and technologies.

Focus on sustainability

The aim was to create the best conditions to support the ambitious path to climate neutrality and to create the prerequisite for processing emission-optimised concretes using CO₂-reduced cements. The possible use of recycled aggregates was also taken into account in the planning. They also paid particular attention to maximising the energy efficiency of the system technology.

CSC-certified concrete products

The Concrete Sustainability Council (CSC) has awarded every Lithonplus plant the Gold certification level for sustainable

business practices in the concrete industry and its supply chain, thereby certifying the company's outstanding sustainability performance. CSC-certified concrete products contribute to a better overall assessment of buildings, are recognised in leading building sustainability assessment systems such as DGNB (German Sustainable Building Council) and improve the scoring of green building projects.

The company-wide implementation of the CSC certification campaign is part of Lithonplus' sustainability strategy. It emphasises the company's clear commitment to responsibly produced concrete.



View of the new mixing plant at Lithonplus



The two THT G-2-V turbine mixers from Teka are the centre-piece of the new concrete mixing plant.

The new production line for customised special parts from high-performance concrete at the Eggenstein-Leopoldshafen site is intended to expand the product range to include free-form manufacturing - in particular designer furniture, seating elements, step systems, reliefs and form liners. The production line also manufactures large quantities of the new generation of L-TEC 80 L-shaped retaining wall with high performance and a filigree cross-section with non-metallic reinforcement. The standard L-TEC range also includes huge heights of 355 cm and 405 cm.

L-TEC system angle - L-shaped retaining wall with fair-faced concrete

Lithonplus has set a new quality benchmark for the L-shaped retaining wall. The universally applicable, reinforced L-shaped retaining wall elements combine efficient placement with effortless handling. They also fulfil very high visual and functional requirements. The L-TEC system angles as per EN 15258 are produced in heights from 55 to 405 cm and lengths from 49 to 199 cm. An optimised suspension system positioned at the centre of gravity has made handling much easier and ensures rapid positioning. The completely form-work-smooth L-shaped retaining walls fulfil the highest exposed concrete class SB4.

Now the new concrete mixing plant supplies the concrete for all these quality products on a daily basis to the complete satisfaction of those responsible at the Eggenstein-Leopoldshafen plant.

Mixing technology from Teka

The two THT G-2-V turbine mixers from Teka are the centre-piece of the new concrete mixing plant. Teka's scope of deliv-



Teka's scope of supply also included a weighing platform, storage containers for the aggregates, binding agent scales, dedusting filter units, binding agent screws and a fibre dosing system.

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Teka high-performance turbine mixer

The Teka THT 1500 high-performance turbine mixer (type G-2-V) has a frequency-controlled 45 kW drive motor and a maximum concrete output of 1.0 m³ per mix. The Teka turbine mixer is equipped with innovative mixing technology and has a patented mixing turbine and counter-rotating mixing stars. The mixing star and the likewise rotating clearing and scraper blades continuously feed material to the mixing turbine. This leads to a very intensive and fast mixing of the material in a very short time, to a very high degree of homogenisation, as well as an almost straight measuring curve during moisture measurement.

The turbine mixer achieves very good mixing results even with small quantities of concrete, e.g. required for individual production. Teka confirms that the desired mixing results can still be achieved in actual use with up to 10 % of the maximum filling quantity of the respective mixer.

The THT turbine mixer is mainly used for facing, coloured, fibre and polymer concretes as well as self-compacting concrete and ultra-high performance concrete. The development concept behind the patented mixing turbine was to build a special mixer that further increases the quality of the mixed product in the case of difficult mixing tasks, shortens the process times regarding the mixing and emptying times and permits an immense variability of batch sizes for the same mixer size. This resulted in the turbine mixer, which can be assembled very precisely due to the well thought-out modular principle. The size of the trough, the drive power and the number of mixing stars themselves are correspondingly variable.



The flat design of the weigh belts is ideally adapted to the available space.

Teka also pays particular attention to operating and maintenance costs. Teka promises users very low wear thanks to the special shaping of the mixing turbine and the low amount of mixing tools. The limited amount of mixing tools also has a noticeable effect on cleaning costs and cleaning intervals.

The new concrete mixing plant is equipped with a fully automatic mixer cleaning system for simple, safe and fast cleaning.

Control system by Sauter

The fully automatic and industrial production of self-compacting concrete is a demanding task that also requires a state-of-the-art mixing plant control system. Lithonplus decided in favour of Sauter GmbH because it wanted to have a reliable and future-oriented partner at its side. Lithonplus has already purchased 21 mixing plant control systems from Sauter and successfully integrated them into its plants. Sauter is highly focussed on the complete integration of all the complex processes of a mixing plant with a high level of development effort. For the Lithonplus project in Eggenstein-Leopoldhafen, the following system components, among others, had to be taken into account:

Aggregates

23 aggregate components, dosage using dosing belts, frequency-controlled coarse/fine dosage, gravimetric dosage with dynamic belt offset, 2 weigh belts, double belt conveyor

Binder

6 binder components, dosage through 15 batching screws, frequency-controlled coarse/fine batching, two binder scales

Admixtures

4 admixture components, 2 admixture double chamber scales



The weigh belts load a cross conveyor arranged underneath, which is designed as a VHV cover belt. The carrying belt pulls off horizontally at the feed point and then rises to a slope of 41° using the patented VHV flexi drum.

Water

4 water components incl. RC water, water weigher, 2 pulse counters for feeding water directly into the mixer



The complete concrete mixing plant is displayed via a visualisation level.

Feeder

2 feeders, frequency-controlled, manual feed, special on-site handling for inspection purposes, intermediate aggregate hopper with laser fill level measurement

Mixer

2 Teka high-performance turbine mixers, frequency-controlled with recipe-, time- and process-dependent regulation. Active mixer dedusting, active mixer cleaning, mixer cameras

Moisture measurement and water dosing

s-visco - Sauter water dosing system, s-sensors - microwave sensors in the mixer, s-sensors - capacitive sensors in the aggregate silos

Other components requiring consideration were proactive colour dosing, the two Kübat bucket conveyors and numerous other points, each of which is important for smooth operation.



Two Kübat bucket conveyors ensure concrete transport in production

The complete concrete mixing plant is displayed via a visualisation level. The Sauter s-systems control all system components of a mixing plant centrally. This ensures high efficiency and availability of the system. The Sauter s-systems ensure high-precision dosing of all components, resulting in consistent concrete quality. Sauter s-systems can be flexibly customised to meet individual requirements. This makes it possible to adapt the control system to the respective system and the specific production conditions.

Conveyor systems by VHV Anlagenbau

Lithonplus's long-standing supplier, VHV Anlagenbau, was contacted to find a technical solution for the new production line at the Eggenstein-Leopoldhafen plant. There was not enough height for the installation of classic weigh belts with a tall material guidance, as the feeding dosing belts were already in place. The available space therefore had to be sufficient for the weigh belts and the lateral haul-off.

A 3D scanner was used to record the existing conditions precisely at the locality. The resulting data was imported into the CAD programme at VHV Anlagenbau, where it forms a point cloud representation.

This point cloud could now be used to design the new equipment. The system could be delivered in pre-assembled components and installed in a short time thanks to the exact measurements and design.

VHV Anlagenbau achieved this with a flat design of the weigh belts, dispensing with a belt trough. Special lateral seals ensure that there the material does not leak and that overall height is reduced.

The two weigh belts, which face each other, load a cross conveyor arranged underneath, which is designed as a VHV cover belt. With this patented solution in steep conveying technology, the carrier belt pulls off horizontally at the feed point and then ascends to a 41° slope using the patented VHV Flexi drum. This is achieved with perfectly smooth, commercially available belts in the VHV sandwich system.



Residual concrete recycling plant from Wema Stahl- und Maschinenbau

a) L-TEC system angle



b) Free-floating steps



c) Modular street furniture system Connect

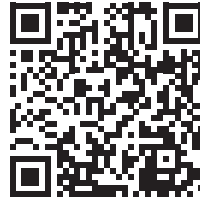


Customised production of special elements from high-performance concrete by Lithonplus

The goods are held between the carrier belt and the cover belt and conveyed upwards. The advantage of this steep conveying system lies in its purity of type and the cleaning option using VHV linear scrapers, which is otherwise impossible with cleated belts.

Washing water and concrete recycling

All process water is treated in the wash water recycling plant and fed back into the production process as new process water. The concrete residues are also processed using the residual concrete recycling plant from Wema Stahl- und Maschinenbau. Here Lithonplus is also fully committed to sustainability. ■



FURTHER INFORMATION



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