

Hess Group GmbH, Burbach-Wahlbach, Germany

Quality that runs along – concrete block line reaches new levels of performance

Oblak Group d.o.o. manufactured concrete products at its Logatec site on an existing system that has been extended over many years. By replacing the central concrete block and paver machine and renewing the cubing system on the dry side, the production line was brought to the best possible new performance level. At the same time, an inline quality control was integrated on the wet side, feeding all relevant geometry and image data of the manufactured concrete products back into the running process. In addition, the existing older system sections received a safety upgrade to a safety PLC.

The benefit of this modernization becomes visible immediately where deviations arise and are assessed. This article therefore follows the material flow through the system, from concrete distribution into the machine through de-molding and inline inspection to sorting and cubing.

Material supply: coarse mix and face mix

The concrete is fed to the machine by conveyor belts. In Logatec, the coarse mix is fed into the filler box via a coarse-mix silo with two outlets. Both silo flaps are electrically driven; the filling level in the filler box is controlled individually by two lasers. This allows the filler box to be fed with high repeat accuracy and positions the concrete far more evenly inside the filler box. For smaller concrete quantities, one of the two gates can additionally be closed manually via an adjustable rear wall. Cleaning openings on both sides of the silo simplify maintenance. The face mix is fed in through a dedicated filling system designed for the production of demanding color patterns.

On the machine side, an important feature here is the filler box planing roller. At the front of the face-mix filler box, a hard chrome-plated, driven planing roller replaces the scraper frame that is otherwise standard. When the filler box moves forward, the roller stands still; on the return stroke it rotates at the same speed as the filler box. It thus smooths the surface, prevents concrete from being pulled out of the mold and keeps the face-mix layer thickness uniform across the entire production area. This has a noticeable effect on product appearance: the face mix can be processed with a higher moisture content, which makes the color more intense and the surface more closed. Pneumatic scrapers on the coarse-mix and face-mix filler boxes additionally keep the table plate clean.



Oblak Group d.o.o. manufactured concrete products at its Logatec site on an existing system that has been extended over many years.

Compaction and de-molding: the new RH 1500-4

The technological heart of the production line is the new concrete block machine Multimat RH 1500-4 MVA. The machine is designed for the high-performance range and achieves its short cycle times through the interaction of control and hydraulics. In the MLC version with servo-hydraulic drive, a variable displacement pump adapts the power dynamically to the respective motion sequence. This reduces energy consumption and allows overlapping movements, for example lowering the tamper head while the filler box is still returning. Via the integrated leakage detection, the control monitors tamper head, mold and filler box and shows the condition of the cylinders in the visualization.

For compaction, the machine is equipped with an amplitude-controlled vibration table. The parameters for pre-vibration, intermediate vibration and main vibration can be set per product by speed and angle. Uniform compaction is the precondition for constant product heights. After compaction, the fresh layer of product is de-molded on the manufacturing board and transported onward via the wet side. When a product change is due, an electrically driven mold change cart moves the mold out of the machine and the new mold back in.

Wet side: weighing and inline quality control

On the wet side, the inspection chain begins, and it begins earlier than expected. Even before the actual inspection station, the empty manufacturing board is weighed in the pallet infeed. After production, the loaded manufacturing board is weighed a second time in the walking beam conveyor before the washing unit. The difference between both values gives the mass of the product layer on top. In addition to the image and geometry data, the machine operator therefore obtains a further, independent measured value for assessing the process.

*In-line quality control
on the wet side*



HESS GROUP

A member of **TOPWERK**

WHERE POWER MEETS PERFECTION



HESS RH 2000-4 MVA

Discover the unmatched strength and perfect performance of the HESS RH 2000-4 MVA crafted to meet and exceed the highest standards in concrete block and paver production. This machine empowers your projects with unparalleled efficiency, combining durability with precision to deliver optimal results in every stone. Experience how power refined into perfection sets new benchmarks in concrete manufacturing.

We put concrete into shape.

Extra short **Cycle Times**
User-friendly **Operation**
Highly reliable **Performance**



Download
brochures
↓

www.hessgroup.com



Visualization of quality control at the control console of the concrete block machine Multimat RH 1500-4

The core of the inspection is the inline quality control, which at Oblak is designed in three stages. The geometric measuring system with two lasers records product height and surface topology without contact. It works in a height range of 25 to 500 millimeters, captures up to two million 3D points and achieves an accuracy of 0.5 millimeters in the height measurement. The height values are measured as the difference of product height relative to the production board, so that uneven boards cannot distort the result.

A high-resolution camera system with color detection builds on this. A lifting frame automatically adjusts camera and LED lighting to the target distance from the product surface stored in the recipe. The AI-supported evaluation is trained per product with only five defect-free layers and then detects defects from one square millimeter, lifted edges from half a millimeter height difference and cracks from half a millimeter width. A distinction is made between break-outs, edge break-outs, lifted areas and cracks. One particular feature is that concrete particles remaining on the product layer as contamination are marked as such and therefore do not trigger a defect. In addition, color intensity, color accuracy and surface structure can be evaluated statistically. A third laser extends the system to high products with chamfers. The inspection thus also covers curbstones up to 300 millimeters in height with chamfers up to 150 millimeters completely across their exposed face.

The practical benefit became apparent at Oblak immediately. The inspection was able to identify precisely which of the existing pallets repeatedly caused problems, because it recorded height differences recognisably and assigned them to the respective pallet. The affected manufacturing boards could then be sorted out in a targeted manner. The camera-based surface detection also convinced the operator:

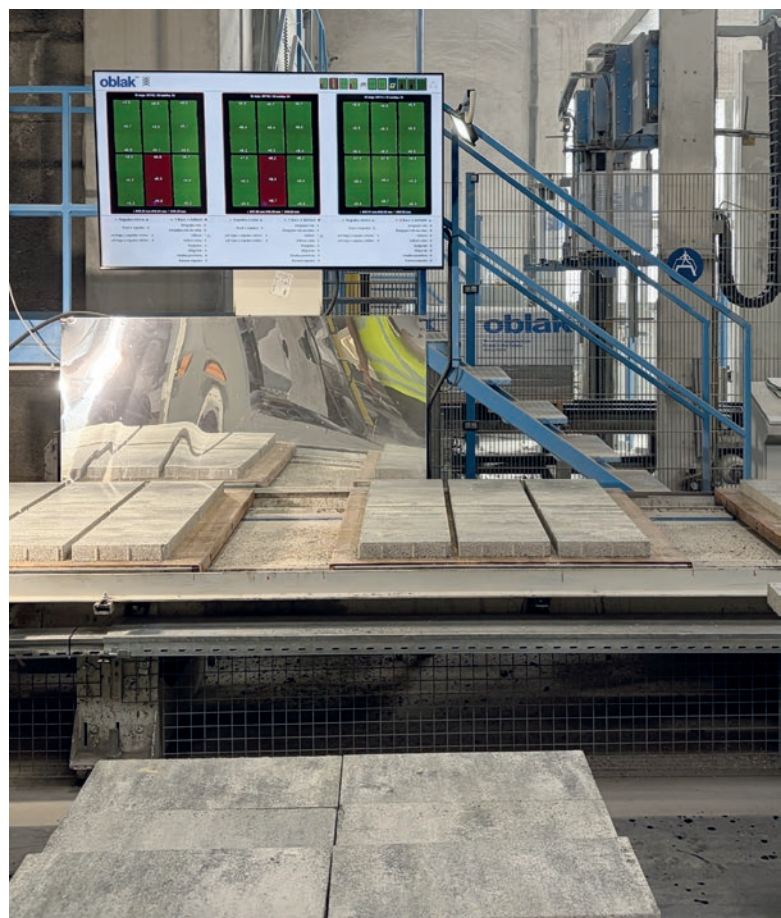
defect patterns become obvious, causes can be traced quicker, and the process can be corrected earlier. A signal light on the wet side additionally makes quality deviations directly visible in the production area.

The inspected product layers are then moved via the wet side into the elevator and subsequently transported by the rotating finger cart system into the kilns for curing.

Dry side: Visualization, stone squeezer and cubing

After curing, the product layers are separated again in the lowerator on the dry side and return to the circulation. There, a visualization of the quality data supports the manual sorting out of defective products. The monitor shows the layer currently to be sorted and already the following layer, each with defective products marked in color, which have to be removed manually and replaced with good products. In addition, statistics for the next thirty layers are shown on the screen. The operator can thus assess the sorting effort in advance and plan his time availability in order to remove all defective blocks in a targeted approach. Which defect filters apply is defined by the operating personnel themselves, according to the quality requirement.

In this area, Hess also integrated the control of the customer-side stone squeezer into the control system, so that the existing equipment runs fully connected to the new compo-



In-line quality control on the dry side



At the end of the dry side, the new Servo 700-2 cuber takes over the transport and stacking of the layers on the packaging line.

nents. At the end of the dry side, the new Servo 700-2 cuber takes over the transport and stacking of the layers on the packaging line. All axes of the cuber are designed as servo drives, resulting in short cycle times with a smooth motion profile. The cuber has a travel path of 4.5 metres and an electric four-sided clamp whose clamping forces and opening width can be set individually adjusted per product. Compared with a hydraulic clamp, oil spills on the product surface and downtimes for oil changes are eliminated; a set-down plate prevents the layer from lifting when it is gripped. The control cabinet was placed on the extended hydraulic platform.

Safety technology on a safety PLC

The project also included a safety upgrade of the existing equipment. Existing safety zones were converted to a safety PLC, older AS-i monitors in areas such as the finger cart system, dry side and washing unit were replaced by ET200 F modules, and the safety doors were supplemented with additional push buttons for activating and acknowledging the zones. The mechanical safety fencing on the dry side received further light barriers at the entrances and transitions of the zones. For the availability of the entire line, this step is just as sensible as the new machine, because the renewed safety technology allows later extensions to be implemented without major intervention.

Implementation: installation, 3D-scan and assembly

One of the most demanding tasks was moving the new machine into the existing building. Besides the limited space, the larger hydraulic tank required an extended platform on which the new control cabinet of the cuber also had to be

accommodated. Assembly was prepared with a comprehensive 3D scan of the existing system, which Hess carried out before the installation started. This clarified dimensions and possible collisions in advance, without having to survey the system at the customer site repeatedly. At the same time, the scan documented the actual condition and serves as a basis for future conversions.

Before delivery of the machine components, the mandatory factory test runs of the concrete block and paver machine and the cuber took place at the Burbach plant, in order to dedicate the time on site to integrating the new components into the existing system and linking the controls.

Result

For Oblak, the outcome is a production line matched to the performance of the new machine. The biggest difference in daily operation is made by the inline quality control. It records deviations, assigns them to their cause and makes them visible to the operating personnel on both the wet and the dry side of the system. This allows earlier and more targeted intervention in the process, and quality becomes traceable across the entire production. It has also been agreed for the joint future that Oblak will support the further development of the quality control with feedback from running operation and that Hess will refine and continuously extend the system accordingly. ■



The HESS GROUP sponsored the free download possibility of the pdf of this article for all readers of CPI. Please check the website www.cpi-worldwide.com/channels/topwerk or scan the QR code with your smartphone to get direct access to this website.



FURTHER INFORMATION

oblak™

oblak group d.o.o.
Tržaška cesta 1a
1370 Logatec, Slovenija
T +386 1 6207570
betonarna@oblak.si
www.oblak.si

HESS GROUP

HESS Group GmbH
Freier-Grund-Straße 123
57299 Burbach-Wahlbach, Germany
T +49 2736 49760
info@hessgroup.com
www.hessgroup.com