

Laird Brothers, Forfar, Angus DD8 3NQ, United Kingdom

Concrete curing system as a core component in a state of the art concrete block production facility

The family-run company Laird Brothers from Forfar in Scotland has 50 employees and is known in large parts of the country as a reliable supplier of concrete. The company is now well prepared for the future with the construction of a new 4,000 m² production hall at the main plant in Forfar and the acquisition of a new concrete block making machine at the beginning of this year. This investment focuses in particular on the production of high-quality concrete blocks, because the demand for such products has strongly increased in recent years. With the extension of the product portfolio by concrete paving blocks, masonry blocks and split blocks, the cousins Jamie and John, together with both their fathers Jim and Alex, now want to expand further, because as a self-sufficient enterprise the company can draw on almost 70 years of experience with four quarries of its own, three ready-mixed concrete plants, mobile mixing plants for smaller projects, its own fleet of vehicles and an already existing Finlay egg laying concrete block making machine. The first production runs with the new plant began a few weeks ago, marking not only a milestone for the Laird Brothers company, but also a premiere for Rotho of Germany, who supplied the concrete curing system. The newly developed Rotho-ProCure concrete curing system represents the state of the art and has been implemented here for the first time in a concrete block production line. The climatic conditions prevailing at this site made the use of this advanced curing and post-treatment system necessary, because widely varying ambient temperatures in combination with constantly changing humidity levels in the area mean that homogenisation of the curing process of concrete products is barely possible without sacrificing quality.

■ Michael von Ahlen, CPI worldwide, Germany ■

The new highly automated concrete block making machine is attached to one of the three existing ready-mixed concrete production sites, resulting in effective production in both product divisions. The company's delivery radius is 60 km for ready-mixed concrete and 80 km for the concrete blocks. Currently, the ready-mix concrete sites together produce approximately 60,000 m³ concrete per year. The production of concrete products in two shift operation amounts to approximately 1 million m² per year.

About half of the hall area is occupied by the new concrete block making machine, which would allow for extension by a further production plant. All plants currently in operation are BSI-certified to ensure maximum product conformity.

Laird Brothers consciously chose two renowned suppliers to the concrete products industry in Rekers and Rotho in order to be able to manufacture concrete products in the usual way with high quality parameters.

In addition to the KRS 4 concrete block making machine, Rekers Maschinen- und Anlagenbau from Emsland also delivered the handling and transport systems on the wet and dry sides. The fully automatic concrete curing system from Rotho ensures optimum curing and post-treatment of the concrete products. The refinement of paving stones, for example, is also possible by means of a stationary ageing unit from KBH.

The concrete production is supplied with high-quality aggregates from the company's four own quarries situated nearby. A



A Haarup mixer and an Eirich mixer supply the concrete block making machine with core and facing concrete.

heating system can preheat aggregates for the ideal preparation of ready-mix concrete in particular, in order to be able deliver quality concretes even in cold seasons. The aggregates for the production of the concrete goods can be preheated separately, ensuring independent operation.



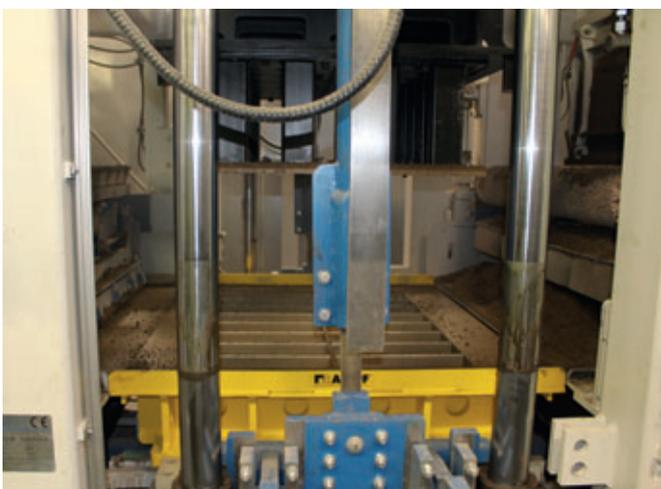
The new production hall at Laird Brothers with a 7-hectare storage yard.

Two concrete mixers provide the high-performance concrete block making machine with fresh concrete. A Haarup mixer with a mixing volume of 3 m³ produces the core concrete, while an Eirich mixer produces the facing concrete. Coloured concretes are also produced at Laird Brothers.

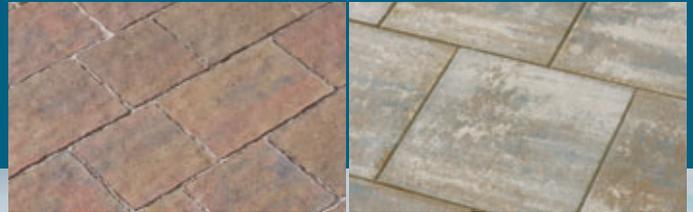
After mixing, two conveyor belts transport of the core and facing concrete to the block making machine, which is fully enclosed for noise protection. The machine consists of a massive machine frame



The concrete block making machine type KRS 4 from Rekers ...



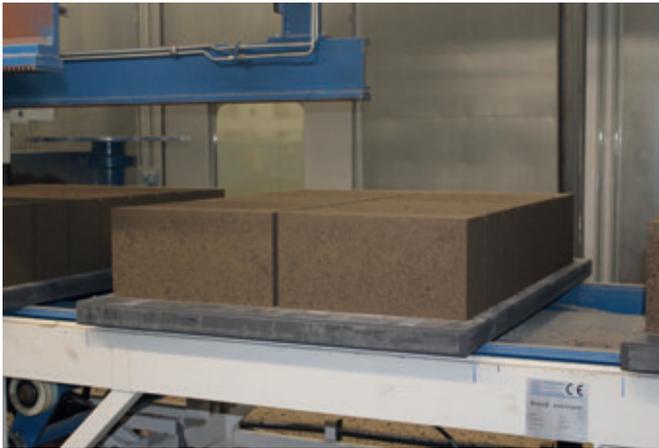
... the concrete block moulds are from Rampf.



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Boards from Wasa provide sufficient stability and load-bearing capacity for the transport of the concrete products.



Random quality control before storage in the curing chamber.

made of MSH profiles and is equipped with many high-quality components, such as a mobile facemix with hydraulic locking, motorised height adjustment for feed box and bunker, self-supporting feed box with servo drive, colour-mix drawing sheet for core and facing concrete, pneumatic fast clamping for mould and tamper, plus the Rekers Vario servo vibration and a board-friendly walking beam conveyor.

In addition, the block making machine has a comprehensive safety system that protects the operators against occupational accidents. The acoustic enclosure has two entrances to the machine, which greatly simplify cleaning and maintenance. Dust accumulating in the enclosure is filtered out by an external dust extraction system.

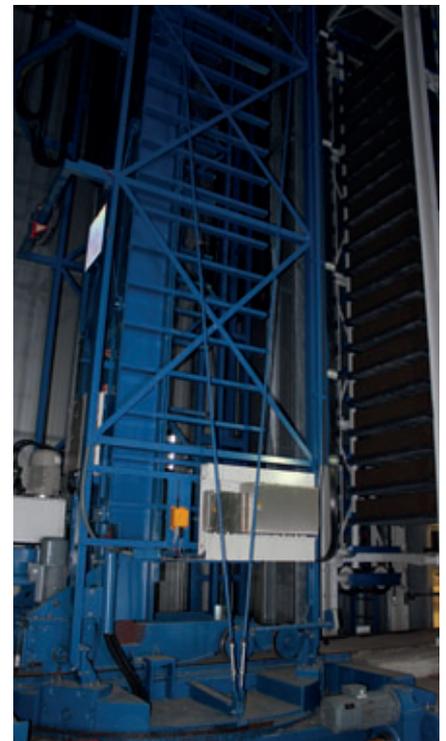
The production boards with the fresh concrete products are removed by a conveyor belt from the acoustic enclosure and pass through a random quality control. The conveyor belt takes the production boards onwards through a small opening in the large climatic chamber and places them directly into the elevator.

Rotho-ProCure concrete curing system as a core component of high-quality concrete block production

The intake of the products through the small opening in the curing chamber ensures maximum energy efficiency, i.e. low losses of heat and moisture. At any time and without leaving his workplace, the operator can easily see the current occupation and status of a total of 16 passages of the concrete curing system, each of which has 22 floors. A maximum of 6,688 production boards can be stored at the same time.



The production boards with the fresh concrete goods are transported into the elevator in the curing chamber by a conveyor belt.



The elevator on the right in the picture is filled with fresh products.

Once the elevator is completely filled, the finger car takes the batch from the elevator and transports the fresh concrete products into the designated chamber of the rack system. The transport speed of the finger car is 1 m/s. As soon as the finger car has reached the appropriate position in front of the rack chamber, it rotates by 90° and drives into the chamber to store the concrete products.

The curing chamber was implemented as a large climatic chamber in which the eleva-

tor/lowerator and transfer table were integrated. The Rotho-ProCure system consists primarily of a steam generator with water softener, a hot-air generator and an air recirculation system. The highly effective air recirculation system installed at the rear of the rack system, which has multiple circulation circuits, extracts the air above the curing rack and blows it in again via a piping system underneath the first level in order to protect the concrete products. The same required quantity of air thus flows around each product. The intelligent system con-



Control station of the new concrete block making machine, from which all important parameters can be controlled, for example the storage management of the curing chamber.

troller continually measures and regulates the temperature and relative humidity in the curing chamber and adjusts them if necessary. An effective exhaust air system limits the maximum moisture content in the curing chamber.

The modularly constructed ProCure system has been deliberately installed separate from the air recirculation system so that existing air recirculation systems can also be retrofitted with heating and humidification. The separately operating circulation circuits allow the input of large amounts of air in a short time. This method ensures a reliable and very high homogeneity of temperature and humidity inside the large chamber.

Unlike a system with central fan, any fan failures here will cause only small restrictions in the operation. In addition, the axial fans installed in the piping system are designed to allow the transport of significantly higher amounts of air than with a central fan.

The advantages that this complex concrete curing system brings are, apart from the fast formation of the early strength of the concrete products, the associated potential saving of cement and an optimised homogeneity with regard to the appearance of the concrete products. Furthermore – and this is always an issue where high-quality concrete products are concerned – the occurrence of primary and secondary efflorescence is reduced due to the ideal curing conditions.

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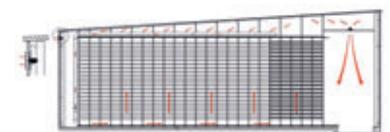


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A total of 6,688 production boards can be stored at the same time in the large climatic chamber.



The finger car takes the cured products out of the rack chamber.



ProCure heating and steam system



Circulation circuits of the ROTHO-ProCure system



The platform of the finger car rotates by 180° during the journey.



Air outlet at the bottom of the chamber. An efficient circulation system ensures a uniform flow with the precisely tempered air mixture.



Transfer of the products to the lowerator.

Conclusions

The management at Laird Brothers opted for first-class equipment for their new production plant among other things due to the high demands that the company places on its concrete products. It follows that high-quality products can only be manufactured with high-quality production equipment and technologies. Although no reference system of the ProCure concrete curing system was available at the time of the planning of the plant, Rotho was able through intensive consultations and a tour of the manufactur-



Rekers also supplied the transport and handling equipment on the dry side of the new plant.



Removal of the block pallets to the 7-hectare open-air storage yard.

ing facility at the headquarters in Neunkirchen, Germany, to convince its business partner Laird to go ahead with the investment. Finally, a professional and individually tailored consultation provided the decisive argument for the purchase of this prototype. ■

View the video of Laird's new concrete block production facility at their site in Forfar, Scotland:



Simply scan the QR code with your Smartphone and watch the video!

FURTHER INFORMATION



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