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Performance, product quality and flexibility: vibrating press of high capacity set-up in Dominican Republic

Renowned for combining high-quality products and product innovation, the company BC Suplidora, manufacturer of concrete products, has been a key player in the Dominican Republic. Based in Santo Domingo, BC Suplidora has decided to increase and upgrade its production facilities in order to cater to a fast-growing market. This manufacturer was looking for a supplier able to assist the company in the achievement of its ambitious objectives in terms of performance and production capacities. BC Suplidora commissioned the French equipment manufacturer Quadra to install a complete production plant, fully automated, including the latest technological advances. The requirements were related to the flexibility, the performance and the efficiency of the equipment provided, with a view to outperforming and offering further enhanced products, and efficiently meeting the growing needs of the customers. The new production unit was also the opportunity to enable BC Suplidorato to extend its range of products. BC Suplidora aims to specialize in the production of concrete kerbstones and to position the company as one of the pioneering manufacturers on the island for this type of product.

Quadra, a manufacturer of turnkey plants, managed the manufacturing and the commissioning of the complete plant from the raw materials reception to the storage of finished products, including the aggregates and cement storage and dosing, the concrete mixing, the vibrating press, the handling systems, the management software and the cubing solution.

BC Suplidora produces a full range of products with its new plant: hollow blocks, paving stones and kerbstones

Concrete plant: design and realisation provided by Quadra

The batching plant as well as the selection of the components were important during the definition of the plant since the concrete preparation and the regularity and consistency of its composition play an important part in the final quality of the manufactured products.

The design of the batching plant evolved a thorough technical analyse. The configuration of the equipment provided has to completely match the current and future needs and manufacturing processes of BC Suplidora. The study focused on the integration of all safety protocols, easy access and maintenance, and the features of the machine that receives the concrete.

The storage hoppers contain three different aggregates and provide a total storage capacity of 120 m³ (40 m3 each). The aggregates dosing is carried out on a belt scale set up below the hoppers. Each aggregate is accurately weighed and dosed. The batch is then transferred to a receiving hopper which loads the mixer.

Quadra has installed a robust, reliable and efficient planetary mixer of the brand OMG type P2000TN (2 m^3 fresh concrete volume). Able to mix and homogenise raw materials quickly, the mixer allows uniform and high-quality concrete manufacturing. The mixer is loaded with water and cement by the water hopper and the cement hopper by a high-precision system. These operations have the advantage of being performed within hidden time and perfectly following the production cycle. Both water and cement are added to the mixer with an exact and balanced quantity of water and cement in order to manufacture the final concrete composition.

The manufactured concrete is then transferred directly to the vibrating press via a belt conveyor (size 1000 x 9300 mm) driven by geared motors with a frequency converter. This system allows uniform mixing inside the hopper.

The batching plant is fully galvanized and is built above the ground level

The mixing system is computer-controlled which enables the mixing process to be followed and the manufacturing recipe to be chosen. It also provides information regarding the filling of the hoppers and the silo and all other elements that impact the quality of the concrete. To finish, Quadra provided fully galvanised equipment. The galvanisation ensures the longevity of equipment by avoiding its quick deterioration due to humidity and changing climate conditions.

Extension of production capacities: the vibrating press type Q12HP and its innovative technical aspects

The block making machine type Q12 HP has proven to be the most productive machine in Quadra's range. Designed for the manufacture of concrete blocks, paving stones, kerbs, slabs

18 blocks are produced per pass within a height accuracy of less than 1 millimetre over the whole surface of the pallet

and kerbstones, its performance enables it to satisfy industrial large-scale production expectations.

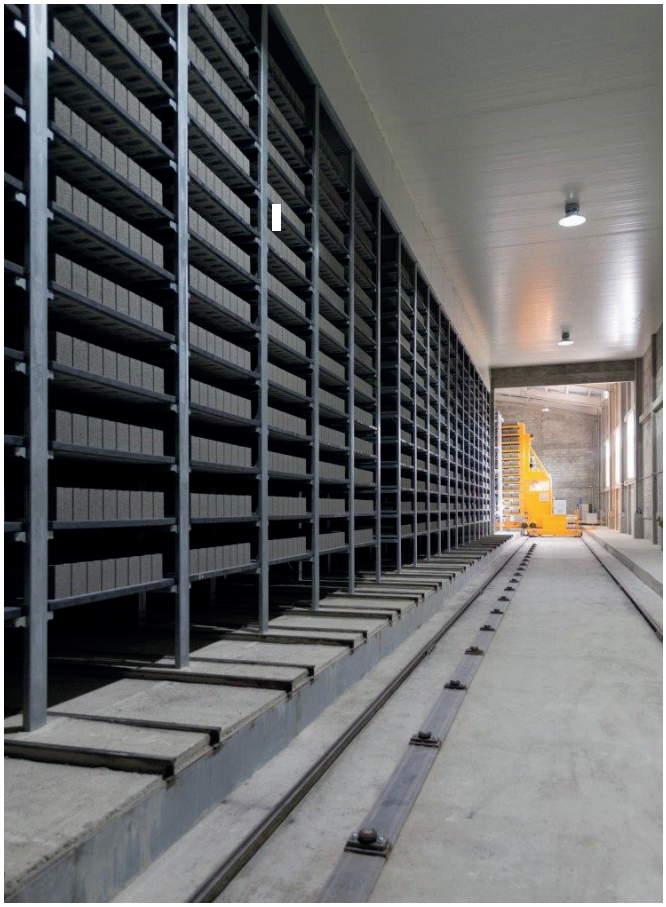
This "state-of-the-art" block making machine provides a high production output while ensuring high flexibility and ease of operation and use. In terms of performance, the cycle time of the Q12 HP is 12 seconds per production board – each with 24 hollow blocks (15 x 20 x 40 cm). This machine uses Wasa-brand plastic pallets measuring 1400 x 1300 x 50 mm.

This new generation of block making machines has the advantage of combining productivity, versatility and high-quality products thanks to several innovative technical aspects.

The system's motors are located on one side, laterally positioned, to allow direct and generous access to the motors. This configuration has the advantage of isolating components from the vibrations, as well as concrete splashes, thus ensuring reliability and longevity of the equipment.

The Q12 HP benefits from an innovative vibrating system which ensures homogeneous distribution of concrete. In fact, it enables the vibration characteristics to be changed between the front and the rear of the mould in order to ensure even filling and produce optimally compacted products. With this process, the Q12 HP is used to producing paving stones as well as kerbstones with facing concrete and blocks of different sizes and geometries under optimum conditions. With this vibrating system, products have a homogeneous density and high resistance to compression.

This block making machine is also equipped with retractable static bars. These static bars are held in their low position during the filling process. The retractable static bars allow maximum vibrating amplitudes of the mould to also ensure shorter



The curing chambers were supplied by Rotho and the production boards by Wasa

cycle times and more efficient filling. In order to ensure a height accuracy of less than 1 mm, the static bars move in an upward direction during the main compaction step to act as the bottom reference for the products. This leads to accurately sized products. The tamper head always moves down to the same position on a mechanical stop. When the tamper head reaches the mechanical stop, a final vibration is performed and allows calibration of the top references of the products. Whatever the height of the products, the tamper head always stops at the same position, thereby achieving consistent height accuracy.

Like the rest of the range of block machines brought onto the market by Quadra, the Q12 HP is positioned on anti-vibration feet, which avoid the propagation of vibration and reduce noise. The kinetic energy involved during the demoulding is absorbed. No vibration is introduced into the ground. The main frame of this Q12 is implemented as a one-piece, heavy, welded construction with a reinforced base unit for heavy loads. It is therefore protected against stress and no specific civil engineering (such as a pit) is required. Thanks to elevated and ventilated architecture, cleaning and maintenance operations are easy to carry out.

Handling system

Product handling is an integral part of the manufacturing process and must be in line with the performance of the block machine. Quadra manufactures fully automated equipment that ensures continuous productivity.

Production boards bearing freshly produced concrete blocks are transferred from the block making machine to the elevator via a conveyor. When the elevator has reached its full capacity (24 pallets with 24 hollow blocks on each), the finger car withdraws the 24 panels from the elevator and takes them to the curing chambers. Provided by Rotho, these are equipped with a ventilated and humidity-controlled system that ensures thorough curing. After a curing time of approximately one day, the production pallets with dry products on them are retrieved by the finger car which brings them back to the lowerator. The position of the finger car is continuously monitored by laser sensor and driven by servo motors. The dry product conveyor of type "walking beam conveyor" moves the pallets gently and quickly. This type of conveyor has the advantage of causing neither wear nor noise.

Palletisation

One cubing robot type Kuka KR 1000, equipped with 6 axes, can load 1300 kg. The cuber is equipped with a clamp that is designed and manufactured by Quadra. The cuber clamp is suitable for all types of products and is designed for supporting heavy loads. The use of servo motors and continuous monitoring of the clamp position allow very high rates and reliable loading, even at a high cubing speed. The settings and

The state-of-the art 6-axis robotic cuber with a payload of 1300 kg. This robot is able to form cubes by using blocks instead of wooden pallets

recipes are easily changed from the control desk. The operator inputs the number of layers, the number of products per layer and their position on the pallet.

This robot enables BC Suplidora to palletise products without any wooden pallet as the overall support. The bottom layer of the pallet is made from products placed horizontally. The finished packages are then retrieved directly by the fork-lift truck on the slat conveyor.

Exit conveyor line using a fork-lift truck

This cubing solution allows the fork-lift truck to pick up the finished package from the conveyor, eliminating any use of wooden pallets. The cubing cycle follows the rate of the block making machine, thereby reducing non-productive times. The robot palletises as fast as the block making machine produces.

Pallets with finished products are then moved outside to the storage platform via a trolley carrying two finished cubes. The rail-guided trolley places the pallet on the dock. This system allows automatic storage of about 15 pallets outside of the manufacturing hall, without immediately requiring the fork-lift truck. This automatic pre-stocking thus provides for organisational flexibility and productivity.

Supervision of the production process

The production line is equipped with a noise-insulated control cabin in which the entire plant is controlled. This workplace has a glazed surface which enables the operator to view the block making machine during operation as well as the whole production process from the concrete manufacturing to the cubing.

The production unit is equipped with high-end control software designed by Quadra. A touch screen terminal allows the adjustment and observation of all parameters. Clear, comprehensive and straightforward instrumentation allows easy modification of the block making machine settings. The reasons for production stops are fully described and, thanks to the program structure, automatic cycles are resumed quickly and easily. All machine settings are stored and recorded by production recipe. Production statistics are also generated (cycle time, filling level, daily production, number of operations per mould, performance, etc.) and may be analysed for continuous enhancement.

Clear and easy to use touch screen interface

Conclusion

The commissioning of this new plant has significantly assisted the expansion of BC Suplidora on the Dominican Republic market. The quality of the customer service, from the beginning of the contract until the final commissioning, has helped the client reach its objectives in terms of productivity and product quality. BC Suplidora is satisfied with the local customer service, which is based on the American continent. It was one of the arguments that convinced BC Suplidora to implement a complete plant from Quadra for the first time.

In addition to a strong commercial presence for some years, Quadra now provides enhanced technical and commercial support in this area. In fact, the opening of Quadra USA Inc (September 2016) is aimed at expanding Quadra's business in this area as well as enhancing the close relationship with its current and future clients based in North America, Mexico, Brazil, the Dominican Republic, Argentina, etc. by ensuring follow-up, technical assistance and on-site customer service. Spare parts are also available on the continent and allow a quick supply.

All technical assistance operations can be performed without any time zone issues. In addition, the remote connection also allows access to all machine parameters in order to provide quick and effective assistance.

FURTHER INFORMATION

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