Quadra, 74130 Contamines-sur-Arve, France

New manufacturing plant with high-capacity vibration press designed to meet the requirements of the US market

In 2017 Quadra decided to export its know-how to the U.S. market by opening a subsidiary – Quadra USA Inc. Having an experienced technical and sales team on site, as well as a spare parts department, has greatly contributed to the company's growth by providing quality local service to customers. Basalite's new project is a large-scale project to which Quadra contributed with relevant and different technical solutions. In business for over 40 years, Basalite has become one of the largest suppliers of concrete masonry products in Western North America.

Unable to increase production at its plant in Denver, CO, Basalite decided to move 25 km north to Fort Lupton, CO. This new location allowed them to design a plant of almost 188,000 square feet, 100 % custom-made, based on a unique concept and design. The facility had to be capable of housing two separate production lines with a 6-block and a 12-block machine, two curing chambers, an indoor batching and mixing plant.

This precast plant project was submitted to several calls for tender. For a project of this scope, it was important for Basalite to be able to surround itself with trusted partners, able to propose innovative solutions.

What makes Basalite unique is its product offering (blocks, pavers, retaining walls, landscaping products, etc.). It includes a wide range of colors, shapes and sizes that can be customized to best suit designers' and owners' preferences. Working with Basalite in the past gave Quadra a real strategic advantage in responding to this tender. In 2018, Quadra designed a state-of-the-art robotic handling system for Basalite's plant in Dupont, WA. At that time, intensive dialogue and close collaboration between teams enabled them to understand and assimilate all the pecularities and production requirements of Basalite.

In addition to productivity and versatility criteria, it was important to provide solutions that would reduce manufacturing costs and labor requirements while maintaining the high quality of the manufactured products.

Quadra's knowledge of the customer, his expectations and his products has enabled the manufacturer of machinery to

Basalite's product range

offer a tailor-made production line, adapted to the products manufactured by Basalite and requiring no human intervention.

As well as responding to rapid and frequent production changes and automatically managing over 200 different product families, this solution is defined by its high production capacity and continuous operation.

State-of-the-art and highly productive plant

The core component of the production unit is the Quadra 12 High Performance vibrating press. This Q12 HP press uses 1,400 x 1,100 x 16 mm steel pallets to manufacture high quality blocks, slabs, pavers, retaining walls and landscaping products at high production rates.

This type of machine stands out for its advantageous technical features.

The vibrating features developed by Quadra are patented and allow its block machines to stand out thanks to their uniform vibrating behavior.

The motorization of the system is located on the side, which allows direct access to the motors, isolating them from vibration stresses and thus guaranteeing the reliability and longevity of the equipment.

This configuration enables to differentiate the vibration parameters between the front and the rear of the mold during the filling phase. As a result, the distribution of the concrete and the density of the products are homogeneous. This previbration system has a decisive advantage in obtaining products of uniform density and consistency over the entire surface of the molding pallet. It also ensures accurate dimensional characteristics of concrete products with less than 1 mm height tolerance. The press is equipped with systems allowing the pallet and the tamper to be mechanically referenced during the final vibration. It guarantees a finished product with constant height corresponding to the distance between the pallet and the tamper. During the vibrating cycle, the pallet is held automatically in reference thanks to retractable static bars. To ensure the upper reference of the product, the tamper stays in the down position as soon as mechanical contact is made with the stops. The position of the tamper stops is remotely adjustable from the control panel, so no manual intervention is necessary.

These unique technical features developed by Quadra offer innovative manufacturing conditions. The synergy between electronics, mechanics and automation makes it possible to identify and adjust the optimal manufacturing conditions for each production cycle. This mechatronic developed by Quadra allows automated control of the machine during each cycle from filling to final vibration.

Vibrating press Q12 HP Quadra

With its rigorous vibration characteristics, Quadra ensures a high quality of the manufactured products in terms of density, strength, weight and height in an optimal cycle time.

Fully automated production changeover

One of the requirements was a quick and fully automatic mold change, with up to five changes per shift.

Quadra has developed a patented innovation that considerably reduces the time required to change production. An automatic stacker crane picks up the mold required for further production and places it on a buffer rack directly next to the press without interrupting production. The buffer rack can store several molds at the same time.

The mold to be changed is removed from the vibrating press and placed in the free space of the buffer rack. The stacker crane then takes the new mold from the buffer rack and loads it into the machine. The entire production changeover cycle takes less than five minutes. As the new production process begins, the stacker crane returns the unused mold to the warehouse. Regarding the automation of the operation, a precise reference of the mold and the tamper is recorded.

In addition, an adjustment of the tamper, the mold and the drawer table of the press enables a precise and automated placement. The recipes for each type of product are automatically incremented.

The automation of the production changeover is a solution that allows to respond quickly to the market demands while improving the operators' working conditions. The automatic mold changeover is performed by the stacker crane in less than five minutes. During this process, the rest of the production line continues to operate. The manufacturing and palletizing lines have been designed to operate independently of each other and thus generate productivity gains. This operation allows the manufacturer to multiply his production changes and thus to benefit from a flexible and versatile production.

Automatic stacker crane that carries out the mold changes

High pressure washing machine

Depending on the type of product, the paving stones are given a surface treatment. Thus, a surface washing treatment station is located between the press and the elevator. A high-pressure water spray is used to clean the top of the products, to remove the thin cement slurry and thus to highlight a specific concrete grain.

Quality control without interrupting production and under safe conditions

Basalite attaches great importance to the control and monitoring of its products' quality.
A quality control station has been set up on the fresh products conveyor. The integrated device allows the lifting of a pallet above the conveyor to working height so that it is accessible from a walkway. This temporary extraction of a pallet with fresh products to carry out the control operation does not cause any production stop. The pallets removed from the press continue their way to the elevator by passing underneath the control station.

The quality check is done in complete safety and this device allows the operator to take all the time necessary to carry out his control operations. Once the verification is completed, a reset button is activated to reintroduce the pallet into the line again without causing production shutdown.

100 % automatic and customized robotic handling system

All automation programs have been developed to handle nearly 200 product families, defined according to their shape, and the type of palletization associated. The main innovation for Quadra is the management of a multitude of products of different shapes, sizes and palletization.

Pallets loaded with dry products are conveyed to the product removal station, where they are picked up and directed by a robot either directly to the palletizing station or to two automatic splitting lines. The split products will continue their progression to the palletizing station. This Kuka KR700-4 axis robot is equipped with a pneumatic gripper designed and manufactured by Quadra. It supplies three conveyor lines which move the products forward to the splitting and palletizing stations.

The products are successively moved on a conveyor and collected by a handling clamp which gathers and carries the products to the palletizing robot. This palletizing robot (KR1000, six axis) rearranges the products according to the pallet stacking. When the pallet is loaded, it is tied up and moved to the building's storage area.

Depending on the range of products and the packaging, products are moved, divided, selected in a precise, repeti-

100 % automatic and customized robotic handling system

tive and fast way to ensure the required productivity given by the press.

Technological choices implemented with movement functions controlled by digitized axes and the use of robots, allow to achieve the palletizing objectives of manufacturer Basalite. This fully automatic palletizing solution, supervised by a single operator, was designed to keep up with the high speed of the press. This complete line does not require any human intervention.

Handling equipment designed for higher productivity

The supply of empty pallets to the press is a priority to ensure a high efficiency of the production unit. For this reason, an automatically managed storage area was built between the manufacturing area and the palletizing area. It can contain up to 900 pallets. An automatic crane manages a reserve and ensures the supply and storage according to priorities. The press output line conveys the pallets loaded with fresh products to the elevator to be stacked on 20 levels with 350 mm steps. This finger car, carrying 20 pallets, handles storage and retrieval operations. This equipment saves a large building area and allows a rational steaming solution with optimal use of the area. The curing area supplied by Rotho can accommodate 6,000 pallets. It is equipped with a ventilated and humidity-controlled system to guarantee rigorous drying and uniform curing and maturing conditions of the products.

The position of the finger car is continuously monitored by a laser and the car is driven by servomotors for accurate plat-

Curing chambers can accommodate up to 6,000 pallets

form positioning in front of the rails of the curing chamber, elevator and lowerator. Walking beam conveyors allow the production pallets to be lifted and moved without friction. The handling and transfer of steel pallets have been designed and implemented to avoid noise and wear.

Summary: A large-scale project

This new Basalite plant marks a significant evolution in the management and operation of concrete products production facilities, as this facility is equipped with all modern and proven equipment. This Basalite manufacturing plant meets all expectations in terms of production capacity, automation and versatility. At the same time, this impressive plant is an important reference for the Quadra manufacturer to demonstrate its know-how in the realization of complete manufacturing processes.

This recent achievement and the future projects underway are the concrete expression of the future strategic orientations deployed in the United States.

Quadra strengthens its presence and establishes its action on a long-term basis. ■

FURTHER INFORMATION

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