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# Inauguration of a factory dedicated to the manufacture of foam filled masonry blocks in France

On October 21 and 22, 2020 the inauguration of the brand new factory of Perin & Cie group took place. Located in Saint Maudez, this facility is the 3<sup>rd</sup> Air'Bloc® plant in France. Air'Bloc technology, patented by Perin & Cie, is made available under a licensing system to all concrete manufacturers. With the license, manufacturers can pre-fabricate and then market Air'Bloc in its catchment area. Currently, 11 prefabricators are members of the "Club Air'Bloc" and 3 use the license.

For the producer of concrete products, the license is a guarantee of uniform quality of production. Products must comply with precise specifications and an inspection body verifies that the characteristics of the product comply with the standards in force. By increasing the number of licensees, the objective is also to reduce transport costs and thus limit environmental impact.

The Saint-Maudez plant



### Innovative concrete block Air'Bloc

Attentive to changes in the construction market and the regulations progress, Perin & Cie has developed a research laboratory to improve their existing products and create new ones. For the group, innovation is permanent on the condition that it stays competitive and corresponds to the market price.

In 2014 Perin & Cie designed and developed the Air'Bloc. It is the combination of a concrete block and an all-mineral cement-based insulating foam called Air'Mousse. To generate the insulation, Air'Mousse, a material patented by Perin & Cie, a special machine must be installed. This filling machine is the result of a 3-year collaboration between Quadra and Perin & Cie group. The investment also includes a grinding machine ensuring concrete block height accuracy with a tolerance of less than 0.5 mm. This equipment can be integrated and adapted to all types of existing plants, and to all brands of machines. Several layout solutions can also be applied depending on production requirements.

Today, Air'Bloc is booming on the French market. It fully meets the current needs of construction in terms of thermal, mechanical, acoustic, seismic and environmental performance. These new products are popular with builders subject to new energy and environmental regulations for buildings.



The Air'Bloc



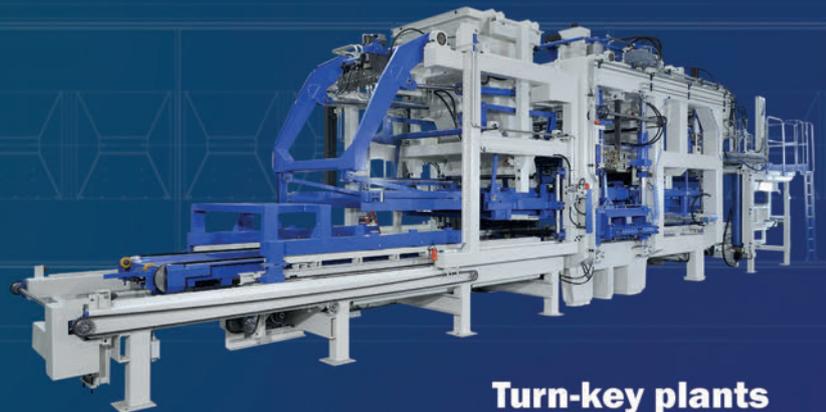
Air'Mousse - insulation patented by Perin & Cie



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**New state-of-the-art Air'Bloc installation**

As industrial partner of Perin & Cie, Quadra is involved in Air'Bloc installations development, provides innovative equipment, while improving existing production lines.

As part of the new investment in Saint-Maudez, it was important for Perin & Cie that their partner would be able to meet precise specifications. Thanks to the technical expertise and after an in-depth study of the project, taking into account future production objectives, Quadra was able to provide an appropriate response.

Given the particularity of the Air'Bloc manufacturing method, the installation of the equipment including the press, the block grinder and the robots was carried out on one side of the curing area and the Air'Mousse dosing and filling unit was installed on the other side. Indeed, the Air'Bloc product passes through the curing area twice during its manufacture; a first time after exiting the press and a second time after having been filled with insulating foam. This particularly rational and functional layout has the advantage to allow each manufacturing step to operate simultaneously and continuously. With its various equipment, this versatile production unit can produce high quality conventional blocks, rectified blocks and Air'Bloc.

**Dosing and filling unit**

One of the specifications key points was the commissioning of a unit for dosing and filling the block cells with an all-mineral cement-based insulating foam called Air'Mousse. The concrete foam, developed by Perin & Cie in collaboration with Ciments Calcia, is made from a mixture of cement, water and air. With a density 17 times lighter than conventional concrete, this foam provides excellent thermal properties, close to current polystyrene insulation, at a low cost.

The foam dosing and filling system has been integrated into the production line, so as not to disrupt the plant productivity. Once manufactured, blocks pass through the curing area. After a few hours of curing, the blocks are reintroduced into the line and routed to the filling station with an optimum adhesion of the foam.

A mechanically welded trolley moving on a track constitutes the rolling path for the movement of the foam dosing unit, from the position to the filling station and to the washing station. It is tailor-made for each installation. Two mobile hoppers, with a capacity of 400 liters, receive the Air'Mousse insulating material. This foam is composed of cement, water, adjuvant and foaming agent. To avoid any stagnation of the foam, a rotating arm located in the middle of the hopper and an agitator located at the bottom are actuated by gear motor. Below the hopper, a mobile frame supports the entire block filling system. The up and down movement is actuated by a gear motor controlled by a frequency variator.

The dosage of foam is volumetric and obtains by laser measurements. This allows the dosage to be carried out in a very



*Air'Mousse dosing and filling unit*

precise and clean manner. On this filling unit, the doser has been designed to fill ten blocks simultaneously. Each block is supplied with foam by a pump whose flow rate is precisely managed and controlled. A closing cover is kept pressed on the upper face of each of the blocks during filling.

Once filled, the blocks are conveyed again to the curing area for a second drying. The curing area can accommodate up to 7,440 pallets. Once the curing process is over, the Air'Blocs are transported to the grinding and palletizing station.

### Grinding machine to process the two sides of the block

In order to respect thermal norms, blocks must be flat and very precise in height. Therefore, a grinding machine has been integrated in the production line between the lowerator and the palletizing area. As blocks are made on wooden pallets, the grinding equipment must allow the two sides of the blocks to be machined; the lower face and the upper face.

A large-sized welded tube frame supports four machining modules. A first roller processes the lower face of the block to constitute the reference (a flat surface) then the three other rollers process the upper face. The first two machining rollers ensure the roughening operation and the third one the finishing operation. These independently adjustable machining modules are positioned and guided on slides ensuring the rigidity and precision required. The machining equipment is of a machine-tool type design ensuring quality machining and height accuracy of concrete blocks with a tolerance of less than 0.5 mm.

The drying time of the blocks must last at least 24 h in order to optimize the grinding speed. The equipment is integrated into the process, and the machining rates follow the press rates with a cycle time per panel varying from 12 to 20 seconds depending on the nature of the aggregates and the thicknesses to be processed.

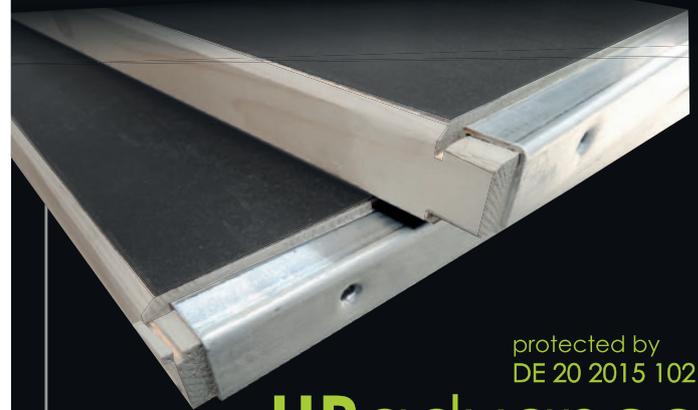
All adjustments such as depth, grinding, translation, speed are made from the control panel. All grinding parameters such as cutting speed or machining feed can be adjusted and stored as recipes corresponding to different types of concrete products. Cutting tool wear management as well as production monitoring are also included in the control software.

Finally, a dust collection and treatment system has been set up to preserve the working environment. A safety cover allows the dust to be contained, which is directly sucked in, filtered and then recovered outside the building. This protective enclosure creates a physical obstacle to secure the space. The opening of the access door is sensor-controlled, and a light curtain secures entry into the grinding machine.

Entirely designed and patented by Quadra, grinding machines are designed and customized according to the production type (type of aggregate used, type of production pallet, cycle time), and integrated into any existing installation.

### Robotic palletizing: speed, precision and versatility

Products handling and palletizing are executed by two Kuka 4-axis robots type KR 700 PA with a load capacity of 700 kg.



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Grinding machine



Dust collection and treatment system to preserve the working environment

The first robot, installed at the exit of the lowerator, responds to two operating modes:

- A palletizing mode for non-grinding blocks (grinding machine out of service),
- A grinding mode: blocks are handled on the conveyor at the entrance to the grinding machine.

The second robot is used only for palletizing grinding blocks. This robot is equipped with a turning clamp that turns blocks over and stacks them in the best way on pallets. Continuous monitoring of the clamp position allows very high rates and precise packaging of the products.

Robots are managed by a software integrated into the Quadra interface. Their parameters are adjustable from the control cabin. The operator indicates the number of rows, the position of the products, their orientation as well as the number of products on each row. Quadra designs and integrates automation programs into its human-machine interfaces. Software can therefore be adapted and updated to follow manufacturing developments

**Conclusion: a successful collaboration between Perin & Cie and Quadra**

The inauguration of the Saint-Maudez factory celebrates a new successful collaboration between the two companies and the creation of the 3<sup>rd</sup> Air'Bloc plant in France. Quadra has been able to design a versatile production unit meeting the needs and production objectives of Perin & Cie. The group can now manufacture traditional blocks as well as Air'Bloc industrially on his new site.



*Kuka 4-axis  
robots type  
KR 700 PA*

These two inaugural days dedicated to introduction and visit of the plant enable to demonstrate the performance of the production unit and the quality of the finished products to the manufacturers, customers and Air'Bloc contractors. This natural, innovative, economic and environmentally friendly product also meets the needs of the construction industry in being technically reliable, having an aesthetic finish, and the production process can be implemented very quickly. ■

FURTHER INFORMATION



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