

Quadra, Comtamine sur Arve, France

# Wetcast production line designed for the manufacture of manholes

Founded in 1946 by René Urvoy, the company Urvoy has been part of the Group Quéguiner since 1994. Specialized in the manufacture of products for the civil engineering and sanitation industry, Urvoy manufactures more than 65,000 t of products per year: concrete pipes, concrete manholes and draining systems. The products manufactured by Urvoy are certified NF. Urvoy carries out dimensional, geometrical, resistance and leakage inspections. Urvoy provides standards and customized products that are inhouse designed in order to adapt their products to each individual project.

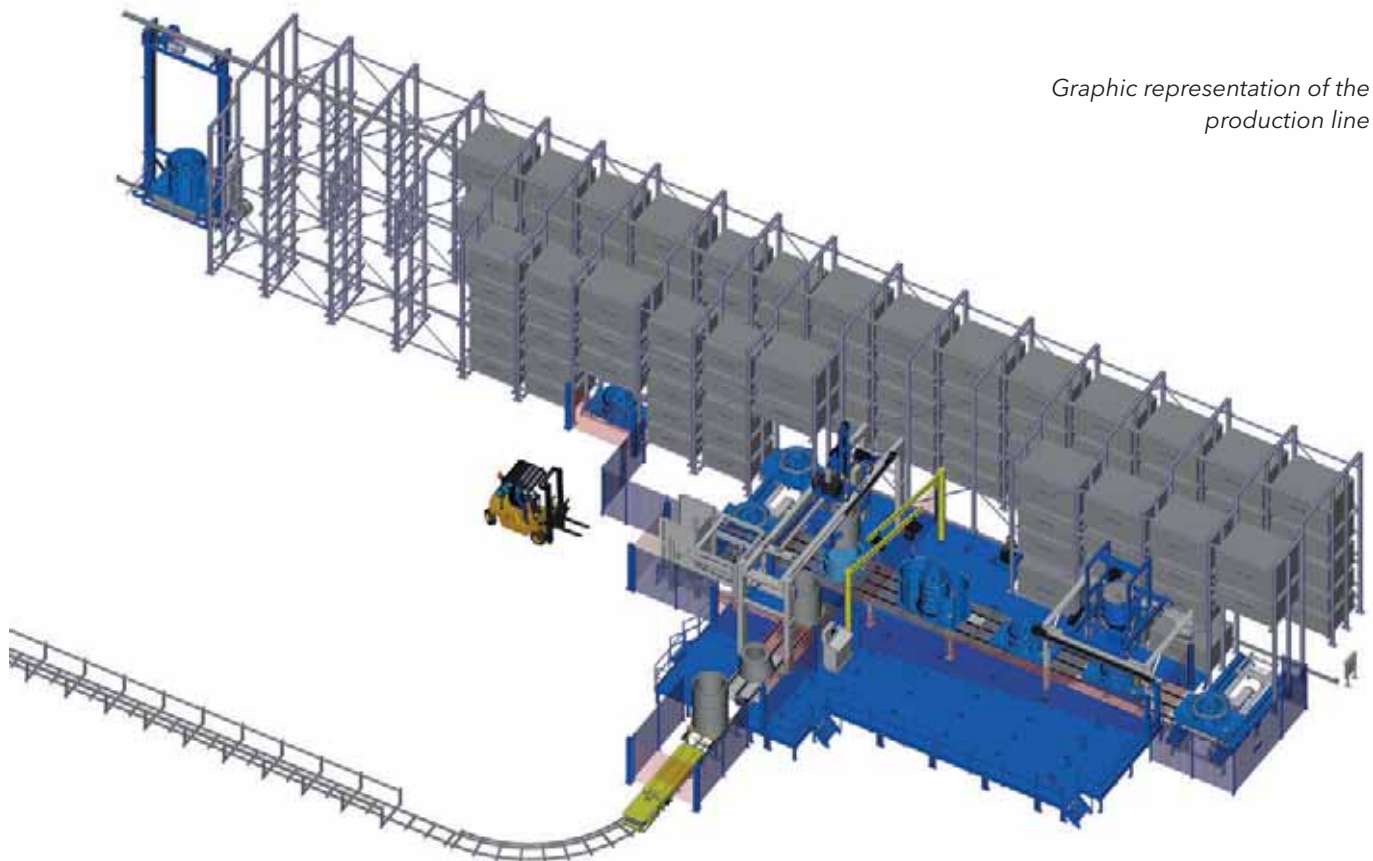
Urvoy has chosen Quadra to supply a new wetcast production line for the manufacture of manholes using self-compacting concrete (SCC).

The manufacturing process and the equipment were designed in order to meet the range of products manufactured

in the line (manhole covers, risers, cones and bases), their dimensions (1m diameter, 300 to 1200mm height), and their production features: cones and risers require a demolding by mold opening while covers and bases are demolded by flipping over.

This new production line has involved a 3D virtual reality reception in order to provide the client with a total immersion in his future plant, as well as an upstream work and validation of the ergonomic and the maintenance access of each working station of the process.

The production unit is made up of the following equipment: full-automatic stacker crane, automated mold filling system, conveying system, demolding and palletizing cuber, and pallet exit conveyor



*Graphic representation of the production line*

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**Mold filling system**

The concrete is led from the reception hopper under the mixer to the dosing hopper using a concrete pump. The level of the concrete in the dosing hopper is measured by a probe ensuring a constant and continuous concrete flow during the filling operation. The concrete is discharged through a valve. The concrete is poured through a 200mm diameter hose made of flexible texture to fill easily narrow walls of the manhole cones or risers. This hopper is based on a mobile frame which enables to adjust the height and the position of the hopper according to the mold. During the filling operation, the hopper moves in two directions allowing homogeneous concrete distribution. A laser sensor displays the level of concrete in the mold and enables the operator to control and eventually adjust the product's height.

This filling station is equipped with an electric hoist integrated to the dosing system which handles the top shape of the risers and cones. They are lifted up during the mold filling and replaced in it when the filling is done.

**Molds handling**

The filled molds are moved to the following station by the conveying system and retrieved by the automatic stacker crane to be placed in the curing area. Moving on rails, the stacker crane is equipped with a telescopic fork to place/remove the



Molds filling system



molds in/from the racks, and place/retrieve them in the conveying system. The motions of the stacker crane and its fork are driven by frequency converters.

Made up of 31 racks, the curing area can receive more than 100 molds of seven different dimension: 1,800 x 1,500mm or 2,200 x 1,500mm, 600 to 1,500mm high. This is the reason why the curing system was designed for optimizing the racks according to the height of the molds.

The curing system was commissioned with a control software allowing the follow up of all molds in curing, the reference of each mold, its location, the date and time of filling.

### Demolding and palettization gantry

Once the concrete has been cured, the molds are retrieved by the stacker crane to be reintroduced in the line. The molds are then moved to the demolding/palettizing station by the conveying system.



*The production line is fed with pallets via a pallet storage system that keeps more than 20 pallets.*



*For manhole risers and cones, the mold is open before demolding.*

This working station has been designed for demolding with two different cycles: turning over the mold and the concrete part is demolded on the shipping palette, or after the mold opening, by picking up the concrete product directly from the mold.

As the manhole bases and covers are filled upside down, the clamp is picking up the mold, turns it over by 180° and demolds the product directly on the shipping palette. For the demolding of the manhole risers and cones, the operator first opens the mold.

Once opened, the clamp grips the product with a fully electrical clamp, and places the finished product on the pallet. Automation allows a fully automatic cycle, but the operator can also take over control from the control desk. The clamping pressure is set according to the product recipe.

Once demolded, the products are cubed on pallets. The production line is fed with pallets via a pallet storage system that keeps more than 20 pallets. The automation of the system feeds one pallet to the palletizing station, while moving the pallet that has just been completed.

A pallet evacuation trolley electrically driven moves the pallets with finished products to the outside of the building. Rail-guided, the trolley places the pallet on a dock with a length of 20m. This solution allows an automatic storage of about 15 pallets outside of the manufacturing hall. This pre-storage system provides organisational flexibility since the pallets with finished products can be removed within 1 h without requiring immediate handling by forklift.

When the mold is empty, it is moved to the preparation station where the operator completes the cleaning, oiling, placing of the steps, accessories and seals. The mold is then ready to be used for a new manufacturing cycle and conveyed to the filling station.



Rail-guided, the trolley places the pallet on a dock with a length of 20m.

Quadra developed a program which is integrated to the control desk in order to automatically launch the printing of a tag identifying the concrete product that has just been manufactured, with date and time of manufacturing.

**Working stations: ergonomic and convenient**

The production line has been designed for improving the work conditions in providing comfort and safety to the operators.

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*The installation of a working platform at breast height enables the operators to easily take action in the line.*

The elimination of all manual handling of heavy loads is ensured by the commissioning of manual handling cranes which make it possible to handle the accessories of the molds during filling, and further during demolding.

In addition, the installation of a working platform at breast height enables the operators to easily take action in the line, safely thanks to light curtains. Indeed, the design of the conveying system enables the operator to cross the line and walk on the line in a safe way. For instance, the operators working in the preparation station are able to clean, oil and set up the steps in the molds safely, and with comfort (direct access, free moves around the molds etc.)

This platform is covered with a concrete slatted floor. It is located above two conveyor belts that retrieve all the waste from underneath the demolding station, and underneath the mold conveying system.

### Conclusion

This new plant, fully designed to meet the manufacturing needs of the customer, provides outstanding production rates (between 15 and 20 molds per hour).

Quadra, manufacturer of smart solutions for the concrete industry, showed its innovation abilities and continuous evolution in using virtual reality during the definition of custom-made manufacturing solutions.

The use of these new technologies such as the 3D simulation and the virtual reception of the complete plant was particularly pertinent as part of this technical and complex solution. This approach enabled Quadra and Urvoy to closely work on all manufacturing features, and to design adapted process and equipment in terms of ergonomics, convenience and efficiency.

Customer Urvoy is currently equipped with a connected interface, ergonomic and multi-support, which enables him to access, in real time, to all the production data as well as the maintenance preconsation. Thanks to the information that is collected, analysed and summarized (graphics, dashboards), the interface in real time allows a clear, comprehensive and instantaneous vision of the past and ongoing production. This is a key tool to optimize and assess the performance of the plant thanks to a complete traceability of the production process. A warning system in case of default provides effectiveness in terms of equipment maintenance. ■

### FURTHER INFORMATION



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