Global approach in local practice

Jean Fabien Cliquioche, Aalborg Portland, Michele Di Marino, Erik Pram Nielsen, and Bi Zhuo Qin, Cementir Group, discuss the enhancement of “glocal” leadership through investments in Rochefort, France.

Terminal in Rochefort

France has traditionally been one of the largest markets in Europe for white cement consumption, with a mature and high demanding customer base for quality, value added services, and innovation. Aalborg White® Cement, produced in Cementir’s European plant in Aalborg, Denmark, has been present in this market for many years. Within the strategic path of developing key markets, with a direct and local approach alongside, Aalborg Portland began in 2013 – 2014 to further develop its presence by enhancing the route to a market model. This was done by establishing a local sales structure with the opening of Aalborg Portland France, as well as by investing into the logistics platform with a long term perspective. In 2014, Aalborg Portland underwent a demanding certification process, which

Aalborg White Terminal in Rochefort, France.

Construction of terminal foundations.

resulted in Aalborg White products becoming certified under Norme Francaise (NF). After obtaining this highly recognised certification in 2015, Aalborg Portland has paved the way for expanding business activities in its French market, namely the import terminal in Rochefort.

After a series of investigations and a comparison of pros and cons, the river port of Rochefort, close to La Rochelle, was determined to be the best location for a cement storage terminal. This was decided both for the highly efficient logistics of the location and environmental protection considerations. Furthermore, cement could be shipped directly to France from the cement plant in Aalborg, which would significantly reduce environmental pollution.

"Cementir Group regards Rochefort Terminal as an important strategic deployment of white cement business in a key market like France," said Michele Di Marino, Chief of Sales, Marketing, and Commercial Development Officer at Cementir Holding. "With approximately €3 million investment, Aalborg White has strengthened its local presence in France, where the supply chain capability for French customers with minimal transport is the primary matter to be emphasised. This strategic investment will also further develop Aalborg White's leading position in the French white cement market, as part of a long term commitment to customers in France, with continuous product supply and a stable high-level services offering."

Project challenges

In 2015, urbanism service in the city of Rochefort limited maximum construction height to 15m. With this limitation, the parallel piped flat silo was designed and adopted to replace the normal cylinder silo. From field investigation, scheme development, discussion and plan adjustment, through to final confirmation, the silo spent a total of six months with tight collaboration between several parties, ultimately conquering the difficulty in silo shape.

The final plan was to erect two 2450m^3 metallic cells next to each other. The unique structure required a 600m^2 concrete slab to be poured as a foundation. Each foot of the silo was attached to a concrete block of about 10m^3, which itself rested on between one and three metal piles of 30m, in order to reach the hard rock under the surface. In total, 100 piles were used to ensure 6500 t of cement could be held when the silo was full.

High efficiency and a green white cement terminal

The construction of terminal foundations started in August 2016 and lasted for three months. In December 2016, began assembling the "huge Meccano," with 24 bottoms that collect cement. This project was completed in the middle of 2017. During the same period, CCI, the public administration of the port, installed the underground pipeline, which connects the shore to the silo at a 70m distance.

Up to 3800 t of cement could be loaded from either traditional bulk carriers or self-unloading vessels, to a cement silo via an underground pipeline.

A self-discharging vessel could deliver its 3500 t of white cement in 20 – 22 hours without stopping.

In order to load trucks, the station is fed by two vertical screws, each of which collects cement from Silo 1 or Silo 2, via three horizontal screw conveyors placed under each silo. Thus, the loading of a 30 t cement tank could be completed in less than 20 minutes. The aim of the vertical screws is to convey large quantities of cement, with the purpose of space saving, easy maintenance, and being pollution free.

High-pressure dense-phase pneumatic conveying systems are the key technique used to transfer white cement from ship to silo. In mind of keeping a green and dustless loading process, three air extraction machines pump 6000 m^3/h of cement, with inside dust filters installed on top of the two silos. This system successfully filters out 99.9% of dust.

Unlike grey cement, colour is the most crucial quality index of white cement product. This strict quality control is managed by the Aalborg Cement Quality Center. White cement quality, including its white colour is monitored and controlled in the Aalborg plant

throughout the whole production process. A cement sample is taken to the boat for conformance testing before being shipped to the Rochefort Terminal. The cement pipeline is dedicated to white cement product conveying, meaning there is no risk of cross pollution. A sample survey of each silo is required four times each year by the Aalborg Cement Quality Centre to ensure cement quality.

With regards to energy saving, Aalborg invested in the instalation of a 400 KVA transformer to feed different motors of the silo structure. Yearly average energy consumption is about 4500 KWh/month, which is below early estimations.

A safe and reliable automated operation system

Unloading and loading cement operations are carried out in an automated monitoring control system. The terminal manager decides which silo to fill and controls the filling of each silo's different captors. When a silo is full, the loading screws can be controlled and driven through a remote management system, which can also carry out daily maintenance operations.

Truck loadings are controlled by a weight bridge and the required weight of cement or maximum weight of a truck (44T) can be set in the management system.

The fully-automated loading system could be conducted by truck drivers alone. However, from a security perspective, a terminal manager should be employed to ensure the onsite safety of every subcontractor and driver. The Rochefort terminal set safety instructions for daily operation. For example, it is forbidden for a driver to climb onto his bulk trailer by little scale. A safety staircase is instead required for drivers to get on top of trailers from the first level of a loading station and drivers are asked to go down to the control office to launch loading when putting a spout in place.

Aalborg InWhite: Cementir Group's white innovation engine

An innovation programme for white cement: Aalborg InWhite, has the purpose of generating a prioritised and actionable pipeline of global initiatives, with high potential for customer value. This aims to provide new solutions for well-known applications or completely new applications for white cement based products.

Cementir Group creates customer value by developing and re-defining sustainable solutions in different levels of customised services. "Cementir wants to challenge the traditional way of looking at white cement as mainly an aesthetic and architectural building material," said Di Marino. "There is untapped potential to further develop a customer's business with white cement that, as a global leader, Cementir has the mission to make available to its partners. "

In the last 12 months, a series of cutting edge white cement application technologies have been triggered under the new "Aalborg InWhite Solution" umbrella,

Installation of cement silos.

A safe and reliable automated operation system on truck loading.

fed by Cementir global market knowledges, a strong industrial network, and its authoritative research and quality center based in Denmark.

It leverages on the unique technical characteristics of Aalborg White cement for some emerging but rapidly expanding applications, such as ultra high-performance Concrete (UHPC) and glass fiber reinforced concrete (GRC), which require high levels of chemical purity and the excellent mechanical properties of the concrete, which can be made with advanced production technologies. Such technologies could help to implement labour cost savings and simplify the construction process, which fully support the megatrends in society, including:

- Low specific weight per m^2.
- Reduced thickness to enable more efficient use of the interior spaces of a building.
- Surfaces produced in a single process to avoid additional treatments.
- Modular and combinable for reuse of materials.

Aalborg White projects in France

In the French market, about 50% of white cement volume applies to featured and cutting edge cement-based building materials, in a high architectural aesthetics requirement. GRC and UHPC are the main emerging technologies used in building façades or cladding.

HPC facade of Evreux Theatre in France.

Precast concrete facade of multi-sports hall building for a polytechnique school in France.

Precast artificial paving stone application in gardening.

Aalborg White and high performance concrete

Project 1: Evreux Theatre in France

In the renovation of Evreux theatre, architecture firm OPUS 5 worked with SAS Guillerm, a French precast concrete manufacturer, to design and produce precast concrete panels that would simulate the movement of a theater curtain. Based on Aalborg White CEM I 52,5 R-SR5, there were 27 pieces of prefabricated panels in high performance fibre reinforced concrete technology, with a weight of 11 t, 13.5m height, and 2.3m width, 8 cm skin thickness, stiffened by reinforced concrete ribs at the back of the panels. All panel surfaces were protected by Hydrophot® to ensure water repellency and photocatalytic cleaning.

Project 2: Polytechnique school in Palaiseau of France

Precast concrete sun blockers, imitating the structure of a DNA helix, were produced by Aalborg White CEM I 52,5 R-SR5 White Cement. Large concrete panels, with 9.3m height and 2m width were produced. The particular shape of the panels, as well as two visible sides, increased the difficulty of demolding. SAS Guillerm developed special, large equipment to produce the perfect concrete panels, with no air bubbles, a smooth surface, and uniform whiteness

Aalborg White and reconstituted stone - garden ornaments

White cement-based reconstituted stone is widely used in garden ornaments and home decorations. A broad range of reconstituted stone products can be applied in wall claddings, facades, interior walls, indoor floors, terraced floors, gate pillars, and wall hats based on white cement raw material. Aalborg White CEM I 52,5 R-SR5 endows ORSOL® high-end architectural cement-based elements, with realistic effect, stable quality, and durability.

About the authors

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