



Intelligent Cement Storage

Eng. Daniele Sciuto, Euromecc S.r.l., Italy,
discusses the installation of a cement
storage plant with minimal operator and
driver involvement.

Introduction

How can one take care of a business second by second whilst travelling around the world? In the 21st century doing so has become a fairly simple reality; smart phones, laptops, etc., can be used to stay on top of sales activities, stock controls and buying services, for example, but this tends to be linked to activities on the commercial side

of business. Would it be possible to manage other activities remotely, such as a cement storage plant? For Euromecc, the answer was 'yes'. The company studied how to provide a full turnkey solution that would allow customers to always be tuned with their storage system, in order to manage loading, unloading and all such processes related to the various cement delivery phases.

Touchscreen for the unloading inside the truck.



Touchscreen for the unloading inside the rail wagon.



Lateral view showing both the unloading solutions.



Starting the render of the entire mechanical installation.



Technical features

In 2012, Euromecc provided a storage installation for bulk Portland cement in Canton Ticino, Switzerland. The installation has a storage capacity of 1820 m³ – about 2420 t – displaced into seven different silos with an internal diameter of 6130 mm and a height of 13 000 mm. Every silo is equipped with two, three or four discharge gates that are all independent, thanks to internal silos separations. As a result, it is possible to store up to nine different kinds of cement with these units.

All of these silos are located in a row and connected in order to provide a complex and useful loading system. There are three independent unloading stations, each with a capacity of 100 m³/hour (two stations for truck loading and one for rail wagon loading).

The load system allows for two different working cycles. Both of these start with the weighing bridge necessary for the weighing phase of upcoming trucks. The first cycle is standard, with a loading pipe for each silo. The second consists of a centralised pipe system, which allows the driver to select the unit that he wants to load directly from the central loading point. Once he has completed his choice, a blower system starts to help the truck or the rail wagon for the entire phase.

Every unloading station is able to load normal trucks or rail wagons using a conveyor screw line that ends with a pneumatic discharger. After the unloading phase, there are two different weighing systems:

- Trucks have to stop on a weighing bridge. There are two other weighing bridges in order to allow the customer to manage more than one truck per time, and the unloading station underpass has been designed to permit two trucks to cross together.
- Rail wagons cannot stop on a weighing surface, so they receive the cement via a slightly different cycle. A buffer silo, which is installed on a load cell system, weighs the cement before it has been loaded into the rail wagon.

Environmental solutions

When talking about the environment, one does not always refer to pollution. In this instance, the environment became an issue in relation to the need to protect the installation from the cold temperatures in Switzerland. That meant finding the right way to keep all pneumatic systems and pipelines safe. The solution provided by Euromecc allows all the condensation dischargers to be heated by a resistors' group, which aids the covering of the different pneumatic dischargers. All the pipes are insulated by caulking, in order to avoid any condensation problems when the cement flow goes through the loading/unloading stations.

With regards to pollution, a special system of dust collectors permits the effective removal of dust from all areas where dust can be generated. Specifically, these are located on the silo peaks,

near the conveyor systems and wherever they are required in accordance with Swiss environmental regulations.

The results of innovation

A sophisticated and customised PLC-based automation can simplify operations and an operator's and driver's involvement in the storage plant, by supporting unattended operations. The system is characterised by multiple PCs, both local and remote, as well as tablets to register orders of the entry and exit of trucks, rail wagons and to monitor the entire system.

On board, a series of touch-screens placed at the entrance, at the exit and next to loading and unloading points, advises the drivers during all the phases of the process. Vehicle entry and exit is monitored by RF-ID badge readers assigned to drivers, vehicles or external transport companies. The system takes into account the possibility of subletting the silos and therefore allows for the issue of different kinds of notes.

During the order-entry process, the automation dynamically verifies the levels in the silos and reports any discrepancies between the entering and exiting orders, highlighting any problems. The data, alarms and graphics are visible simultaneously from various fixed and mobile work stations, which can stop at any time for security issues. On request, at the end of the daily loading schedule, the system can send each driver or transport company an SMS or email containing all the data regarding scheduled loads in ascending time order.

The software provides a queue management system using touchscreen and LED display; the operator is guided to a rest area if all the loading and unloading points are occupied.

The operator has the option to choose one of four languages on the touchscreen on the machine. From the various command stations, the operator is able to make an emergency call to the administrator with a GSM or VoIP voice system, and the administrator can communicate with the operator via voice messages that will be released by loud speakers onsite.

Each control station on board is equipped with electromechanical controls that can be used in the case of automation failure.

Conclusion

This installation proves that by using the latest technology it is possible to enhance the standard of cement storage plants, improving efficiency and work quality. Euromecc continues to develop and test new ways to meet the most challenging enquiries concerning storage systems for bulk materials and systems related to concrete batching plants, while focusing its attention on user experience and customer satisfaction. 



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