

Pittsburgh picks up the pace

To better meet market demand and ensure a faster turn-around of deliveries, Lafarge modernised its Pittsburgh Crafton terminal in Pennsylvania, USA. The work saw the installation of improved rail car unloading facilities as well as an increase in on-site cement storage capacity.

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To improve rail car unloading, speed up truck loading and expand on-site cement storage at its Pittsburgh Crafton terminal in Pennsylvania, USA, LafargeHolcim analysed its current operations and, together with PENTA Engineering, developed a cost-efficient design.

Design and procurement

LafargeHolcim's Senior Manager – Terminal Projects, Adam Cimaroli, worked closely with PENTA Engineering's Project Manager, Ney Linares, to develop the project's concepts. Following weekly project review meetings between the two management teams, the design was completed.

The final design consisted of the following major components:

- pneumatic rail car unloading system,

using Cyclonaire equipment

- rail car unloading pit and shed roof structure to provide weather protection for the new system
- new 800t cement storage bolted steel silo
- new bin vent dust collector for the new bin and replacement of bags and pressure relief valve for the existing silo and bin vent
- new air compressor for the entire system
- new air slide to convey cement from the new storage silo to the existing truck loading spout through a modified chute entry
- new flow control gate and maintenance gates.

Figure 1: new bolted silo at mid-height



Figure 2: bolted silo complete



using Cyclonaire equipment

The options considered for rail truck unloading to silo included a bucket elevator with screw feeders, an FLSmidth Fuller-Kinyon® Pump pneumatic unloading system or Cyclonaire's dual-phase cyclone-type pneumatic system.

The limited footprint available for the unloading equipment resulted in the selection of the dual-phase pneumatic vacuum/transporter unloading system.

The size of the site and lack of space for the new storage silo, as well as the unavailability to put

existing rail car unloading operations on hold for more than four days were some of the challenges for the design team. The new 800t bolted steel tank silo, supplied and assembled by Tank Connection, had to be erected very close to an existing silo and the control building.

Typically, the design of a rail car unloading system includes a three-sided shed building for weather protection during unloading. Due to the close proximity between the parallel rail lines, it was not possible to install the protective shed. Instead, specially-designed light-weight pit covers were installed to keep the small hopper and pits below the unloading rail car dry.

Construction

The foundations and rail car unloading pit for the central POD Cyclonaire equipment, Cyclonaire blower and the new silo were completed on 10 January 2017, not the ideal time for concrete work in the Pittsburgh area. Therefore, heaters were installed to properly cure the concrete.

The silo installation started on 11 January. The installation method was a jack-and-pump system. This method starts at ground level with the assembly of the roof, continuing by jacking up every assembled section to then install the next lower section. The new silo reached its full 30m (98ft) height on 22 January. Two days later, all finishing details of the bin were completed. Therefore, construction took 13 days of actual work (see Figures 1 and 2).

Installation of the main Cyclonaire equipment was carried out between 12-20 January. During this time, PENTA'S construction management was in contact with Cyclonaire technical support to comply with the system's installation specifications.

The connections for pressurised air and the 30.5cm (12in) pipe conveying cement to both storage silos were installed during the following three weeks. Installation of the cement conveying pipe had a critical part at one-third of the height of the existing silo. At this elevation, the 'Y' section with a pinch valve on each bifurcation was installed to control the flow for either the existing or the new silo.



Figure 3: Cyclonaire equipment under construction

The existing silo dust collector had to be updated with new bags and a larger filter area.

The new silo unloading system consisted of an airside, blower and valves. A dust collector was installed on the silo roof to vent the unloading system.

To maintain normal operation at the terminal, the maintenance work of the existing air slide feeding the truck load-out-spout from the existing silo was carried out during a weekend.

Commissioning

Commissioning activities took place between 12-24 March. Electrical tests were completed without major delays, but the programming of the new system faced some drawbacks. Merging the existing with the new computer software was challenging. It required teamwork and Cyclonaire's technical support to finally get the new controls to work with the existing system and start dry commissioning.

Dry commissioning

The mechanical dry commissioning focussed on the rail car unloading and silo loading systems. The new compressor and the blower for the Cyclonaire system were commissioned without major delays.

In testing the Cyclonaire equipment, the primary concern was to verify proper air pressures and vacuums of the cement conveying system. The Cyclonaire is a high-velocity, low-pressure system to convey powder materials. The system's in-line pinch valves work with bladders by obstructing flow when inflated to divert flow to each silo.

Wet commissioning

Wet commissioning started with Cyclonaire equipment unloading the



Figure 4: PENTA engineer working on merging new and existing programmes



Figure 5: rail car unloading part of the completed project

rail car to the existing silo. After a few adjustments on the boot-lift seal of the connection to the rail car unloading valve, wet commissioning got under way. Adjustments to the different pressure air valves of the Cyclonaire system were made and after unloading the first rail car was

complete, the unloading rate reached the expected mark. During this process, the existing air pressure relief valve at the top of the existing silo had to be changed due to wear and because it was opening at a pressure lower than expected. A new valve was ordered and installed.

Once the existing silo was commissioned and trucks were being loaded at the specified rates, the final commissioning efforts focussed on the new silo and its discharge system. The first attempt to load the new silo went well after some adjustments were made to the dust collector. The unloading of the new silo was the most challenging commissioning phase in making adjustments to the controls for the valve feeding the airside to the truck loadout spout.

Finally, the valve adjustments reached a point where the topping-off loads were the correct amount.

After finalising the punch list and completing the final walk through with the site's project manager and the terminal manager, construction was demobilised on 30 March.

The total project duration from conceptual design to commissioning was 12 months. The result is a more efficient terminal with improved rail car unloading, truck loading and larger storage facilities that enable LafargeHolcim to deliver a better customer service. ■

Figure 6: view of completed new silo and the remodelled existing silo

