Continental Cement – bigger and better storage

Continental Cement Co addressed limited cement storage capacity on land and replaced some of its river storage with a new dome silo supplied by Dome Technology. As a result, the cement producer was able to save costs while maintaining the quality of its end product.

■ *by **Rebecca Long Pyper**, Dome Technology, USA*

Continental Cement Co (CCC), a Summit Materials company, has built another DomeSilo with Dome Technology, this time at its facility in Davenport, Iowa, USA – marking the third collaboration between the two companies.

The new DomeSilo has a capacity of 113,398t (125,000st) and, according to Dome Technology's records, the structure is among the largest-capacity cement storage facilities in the world, highlights Sales Manager, Lane Roberts.

The dome size helps to better address demand that has been building for the past decade. Before the introduction of the dome, CCC's Davenport facility grappled with limited cement storage capacity, necessitating the loading of cement onto barges and storage on the river during winter months. With cement and barge demurrage costs increasing, CCC recognised this was not a sustainable plan and commissioned this transformational dome project. The strategic move not only lowers CCC's costs and enhances operational efficiency but also improves safety performance – a foundational value of CCC and Summit Materials.

"CCC's Davenport plant was able to reduce its demurrage costs for cement storage on the river and eliminate the need to curtail production. This project positions us well to meet customer commitments and ensure adequate supply coming out of the winter months into the busy spring and summer seasons," commented Brett Imsland, CCC Plant Manager.

The facility, then and now

The Davenport facility produces cement from raw materials sourced from a nearby quarry. The final product is stored on site before being delivered to customers predominately by barge as well as by truck and rail.

The 113,398t new dome at its Davenport facility helps Continental Cement serve its growing number of customers in the Iowa market

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Multiple existing concrete silos are utilised at the Davenport facility for cement storage in addition to the new DomeSilo dome. The new dome is ϕ50.3m (165ft) and 52.3m (171.5ft) tall. An FLSmidth Ful-Floor™ pneumatic reclaim system mobilises product. The floor is faceted with slopes in four directions, moving cement to a single tunnel measuring 4.3m (14ft) wide x 3.7m (12ft) tall. Cement is reclaimed at 317.5tph (350stph) and pneumatically conveyed to barges on the Mississippi River.

The area below the DomeSilo was unconfirmed fill. To ensure a proper foundation, the site was mass excavated to bedrock and backfilled with structural backfill. The new DomeSilo is directly adjacent to the existing concrete silos, and additional care was taken to ensure the existing silo foundations were not underpinned during the mass excavation. This took a collaborative design effort between Dome Technology and CCC.

Collaboration was key in every element at Davenport. According to Mr Roberts, CCC provided valuable direction on how the dome would be used operationally, and FLSmidth developed a customised, economical reclaim solution based on the company's input and project needs. Dome Technology's role was to take CCC's operational goals and combine these with solutions to produce a seamless dome facility.

In collaboration with CCC, Dome Technology helped provide technical solutions beyond the DomeSilo construction, including construction of the large reclaim tunnel and installation of

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the Ful-Floor reclaim system and aeration piping.

Dome Technology's scope of work also included construction of a mechanical/electrical building and demolition of three bays in an existing building to make way for the DomeSilo and the new mechanical/electrical building.

Dome storage benefits

Storage is often one of the largest components in any new facility, and a dome is built with an unlimited lifespan – its concrete shell and geometry boast unrivalled strength. Dome construction methods require no interior trusses, so the entire inside volume can be utilised for storage or reclaim systems.

All domes provide ideal conditions for stored materials requiring a controlled environment. Seamless concrete construction, coupled with a fabric membrane surrounding the entire dome, prevents water and moisture from seeping in. The dome's insulated nature reduces heating and cooling of the walls and air inside, preventing condensation from forming on the interior and extending the life of the concrete structure.

A dome's strength and geometry also provide a tolerance for some differential settlement. Those qualities, combined with geotechnical engineering and site analysis, ensure proper foundation selection and performance.

Domes for cement storage

The most common dome model for cement storage supplied by Dome Technology is the DomeSilo, a structure that is taller than it is wide and allows companies to stack product deeper on a smaller footprint, requiring less land at the site. The increased capacity is made possible by geometry: the double curvature of a dome lends itself to the ability to build up, rather than out, and the curve provides strength at all points of the structure, even at the apex. The entire interior can be used to contain product.

In recent years Dome Technology introduced a second type of DomeSilo: the Drive-Through DomeSilo that allows companies to fill truck or rail directly from the storage structure and speed up the process of product reception to delivery. The Drive-Thru delivers 100 per cent live reclaim from a fully-aerated floor. Product flows through a hopper for loading into truck and/or rail. An in-line lump crusher on the loadout stack-up ensures that lumps passed through the receiving system do not make it into trucks.

In 2018 a Drive-Thru DomeSilo was built at a recently-acquired CCC site in Memphis, Tennessee. While the existing silo and adjacent scale had not been used for some time, complete upgrades of these assets along with a new barge unloader, dock upgrades and Drive-Thru DomeSilo has allowed CCC to become the leader in service in the Memphis market.

The benefits of teaming up again

Partnering on repeat projects benefits all the players involved – the evidence is clear in this third robust project borne of CCC and Dome Technology collaboration.

"It's a strong indication of trust. It is kind of like a marriage relationship – you get to know what the other partner is like, and it's easier to talk through differences and resolve problems that will inevitably come up," Mr Roberts said. "They know us, and we know how they think and feel, and we can better match our skill set to their needs the more we work with them." ■