

DemcoTECH Engineering: designing conveyors for optimal materials handling

Materials handling and niche process plant specialist, DemcoTECH Engineering applied its engineering expertise to the construction of the new fly ash silo for leading South Africa-based cement producer, NPC-Inter cement's Simuma Plant in KwaZulu-Natal. The fly ash silo contract was a continuation of the business relationship DemcoTECH has enjoyed with NPC, having previously successfully completed a 40,000-tonne clinker silo for the plant in a venture with Kantey & Templer.

The 1,000-tonne steel fly ash silo, completed in 2016, was executed on a turnkey basis with DemcoTECH providing the detailed design and layout as well as being responsible for the structural, mechanical, electrical, control and instrumentation engineering. The silo is part of NPC's strategy to include fly ash as an additive in the cement production process. Using pulverized fly ash (PFA), an important and cost-effective supplement in the production of Portland cement concrete, is an environmentally-friendly solution that enhances performance specifications for cement.

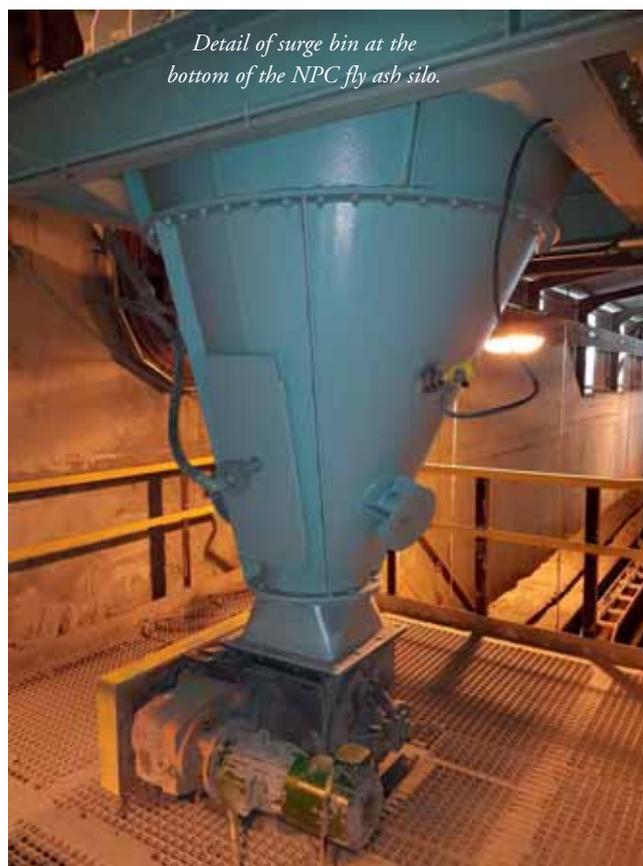
The newly completed silo receives fly ash imported from nearby boilers, transported in road tankers to Simuma and offloaded pneumatically from the tankers into the silo. The fly ash is then removed from the silo using a rotary valve feed system and transported to a surge bin via two newly installed 20tph (tonnes per hour) tandem screw conveyors. The fly ash is subsequently loaded onto the existing belt conveyor at a predetermined tonnage as specified by the operator.

"Screw conveyors are widely applied in such applications," says DemcoTECH Engineering General Manager, Paul van de Vyver, "and are versatile and cost-effective mechanical conveyors for handling dry bulk solids. Other benefits of the screw conveyor, which is essentially a screw mounted in an enclosed U-shaped tubular housing, is the ability to transfer materials horizontally or at a small incline.

"As fly ash is a fluidizable material, it flows like a liquid when aerated and an aeration system has been employed on the 20m-high, 10m-diameter silo to ensure consistent and controlled flow of the fly ash and to prevent any blockages.

"As dust is generated at any point where fly ash is moved or transferred, an effective dust extraction system was therefore included."

DemcoTECH's conveyor expertise is underpinned by an extensive materials handling track record covering a broad range



Detail of surge bin at the bottom of the NPC fly ash silo.

of materials from coal through to gold ore, iron ore diamondiferous material, tailings and industrial products such as cement.

"For an operation to be profitable, the entire materials handling system must be optimized and reliable, based on a thorough understanding of the specific material flow characteristics of the product to be conveyed," says van de Vyver. "In addition to offering access to the latest technologies such as AeroConveyors™, pipe conveyors and pneumatic conveying systems, DemcoTECH utilizes advanced testing and modelling/simulation tools to design efficient, fit-for-purpose handling systems. Critical elements include determining the chute geometry to give the desired capacity, providing a flow pattern with acceptable characteristics, and thorough design and detailing of the conveyor plant.

"Our conveyor design and dynamic analysis capabilities, together with Finite Element Analysis skills, are underpinned by our in-house developed design packages, which are based on ISO and CEMA standards," adds van de Vyver.

Recent projects range from the turnkey contract for a shuttle conveyor for a mining house in South Africa and the detailed design for an import terminal at Port of Ploce in Croatia, handling both iron ore and coal,



NPC fly ash silo: 20tph tandem screw conveyors.

through to a large contract for the multimillion-dollar iron-ore import/export facility in Lumut, Perak, Malaysia, for Brazilian major mining group Vale. Taking a number of years to complete, this giant complex includes an ore storage yard and a marine terminal with a 60-million-tonnes-a-year capability.

In earlier work, DemcoTECH was responsible for the materials handling portion of the expansion to Grindrod's multi product terminal at the port of Richards Bay in South Africa. The scope of the contract covered providing the materials handling to convey various materials, but mainly rock, phosphate and coal, from the three Richards Bay terminal sites: Navitrade, Kusasa and Valley. Both belt and pipe conveyors were employed at this brownfields site at one of the largest terminals in the world.

In 2013, DemcoTECH completed the expansion of a manganese export facility for local manganese miner Assmang at its Cato Ridge Alloys plant, in KwaZulu-Natal, while



The NPC fly ash silo, completed in 2016, executed on a turnkey basis by DemcoTECH.

DemcoTECH's conveyor expertise has also been widely proven in challenging diamond tailings handling applications through a decade long working relationship with Letšeng Diamond Mine in Lesotho.

Contracted first in 2008 for the tailings disposal system, DemcoTECH has continued to service the mine's expansion initiatives, with its most recent work focused on upgrading part of the mine tailings materials handling capability. In addition to upgrading the ROM (run of mine) stacker as a turnkey contract,

DemcoTECH completed the conveyor design and expansion layout to increase the tailings dam to handle the expanded throughput.

The system DemcoTECH originally supplied for the mine included a conveyor with fixed tripper and multiple discharge points, a 1.6km overland conveyor and a 1km-long tail-driven downhill extendable conveyor with a rail-mounted tripper and boom spreader, as well as an emergency dump system. The route

of the overland conveyors had to accommodate Lesotho's mountainous terrain, requiring special engineering solutions, such as the inclusion of a regenerative braking system on the tail pulley of the extendable conveyor to prevent the conveyor from running away. The system was also required to operate at ambient temperatures ranging from +30°C to -25°C in wind speeds higher than 100km/h on a very exposed site.

ABOUT DEMCO TECH

DemcoTECH Engineering is a specialist bulk materials handling and niche process plant company, offering services from concept design through to project completion to the power generation, cement, mining, metallurgical, manufacturing and port handling industries. Services include conceptual design, feasibility studies, design, engineering, procurement, expediting, construction and commissioning. Plant supplied by DemcoTECH includes troughed conveyors, air-supported conveyors, pipe conveyors, rail-mounted slewing boom stackers, pivot boom conveyors and mobile conveyors. After-sales services include spares, maintenance, refurbishments and operational readiness packages covering procedures, systems and workplace tools required to successfully operate and maintain a new or upgraded plant.

*1,000-tonne NPC
steel fly ash silo.*

