

ICR article draft

Optimising cement output

by **DemcOTECH,**
South Africa

The poor flow characteristics of many of the raw materials handled at a cement plant during feeding and reclaiming from stockpiles, storage silos or hoppers call for specially-designed technologies and systems that can accommodate materials that are often dusty, very abrasive to equipment, and build up in chutes and on conveyor belts. To address these needs materials handling specialist, DemcoTECH offers a range of bulk materials handling solutions to its growing international client list, including key projects undertaken for NPC-Cimpor (South Africa) and Nova Cimangola.

As part of NPC-Cimpor's expansion drive to build a second kiln line at its Simuma facility in KwaZulu-Natal, South Africa, the cement producer required an additional silo to store the extra clinker output. DemcOTECH and Kantey and Templer Engineers of South Africa, were awarded the joint venture contract for the new 40,000t multi-discharge clinker silo which also needed to take into account the environmentally-sensitive location of the plant. Kantey and Templer was responsible for the civil and structural design, engineering and project execution, while DemcOTECH carried out the materials handling elements of the project, including the mechanical and electrical design, engineering and project execution of the system.

"Positioned alongside the existing silo, the new silo was completed within 15 months as a fast-track turnkey project. Designed to handle hot clinker up to 205°C, the silo features a clinker feed system that can feed clinker to either the existing or the new silo," notes DemcOTECH Engineering General Manager, Paul van de Vyver.

Silo statistics

The clinker silo consists of a 40,000t free-capacity, reinforced, prestressed structure with a 30m internal diameter and 55m height. It has two reclaiming tunnels and a precast concrete conical roof.

The structure is constructed on a full raft foundation, 36m in diameter and

1.3m thick. This foundation is built on an engineered fill layer, which extends 4m below natural ground level.

The silo receives clinker from the kiln via an Aumund steel pan conveyor and discharges at a rate of 250tph onto two DemcOTECH-designed reclaim conveyor belts. The reclaim conveyor belts are manufactured from heat-resistant belting and feed the existing plant or rail-loading system.

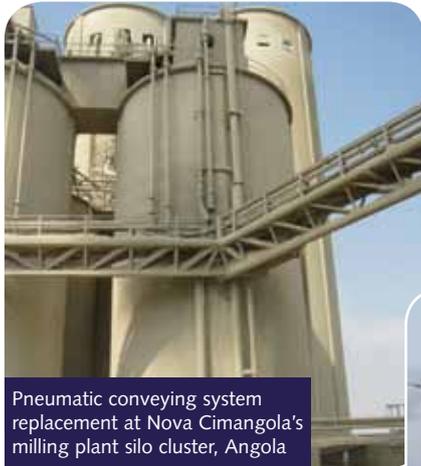


NPC Cimpor's Simuma plant in KwaZulu-Natal, South Africa, benefits from a new 40,000t multi-discharge clinker silo to meet the extra clinker storage requirements presented by a recently-built second kiln line

Environmental approach

With the increasing environmental regulatory and social pressure, maintaining a clean environment is a priority for DemcOTECH. "As a result, all equipment we design and install complies with environmental and safety requirements," says Mr Van de Vyver. The Simuma project was no exception.

"The Simuma cement plant is located alongside its limestone source in the mountainous, environmentally-sensitive Oribi Gorge area of KwaZulu-Natal. Accordingly, the design ensures that dust emissions from the plant are controlled well below regulatory requirements," he adds. "Dust extraction filters are included on the silo and at all the transfer points to ensure the dust emissions comply with the safety and health regulatory limits."



Pneumatic conveying system replacement at Nova Cimangola's milling plant silo cluster, Angola

From plant to terminal

In addition to materials handling equipment for cement plants, DemcoTECH also supplies cement terminal operators with specialised pneumatic and pipe conveyor systems for cement handling. Cement producers in Africa and further afield in India have benefitted from the South African company's expertise.

"For example, working in conjunction with Claudius Peters in Germany, we supplied a 150tph pneumatic transport system to convey cement from a kiln to multiple storage silos at Nova Cimangola's cement plant in Luanda, Angola," says Mr van de Vyver.

The system has a conveying distance of over 300m and, as a brownfield project, had to be designed to follow a tortuous route to fit into the existing plant and include seven discharge points into the existing silos. Moreover, as an operating

plant, the downtime needed to be minimised during tie-in to avoid negative impacts on production.

Pipe conveyors designed by DemcoTECH comprise both fabric and steel cord belting, have up to 2250tph conveying capacity and are up to 500mm in diameter.



Travelling maintenance trolley on 15°-inclined triangular gantry at the Nova Cimangola works

"We have also engineered two-way pipe conveyors, multiple curve pipe conveyors and distributed drive pipe conveyors with excellent results," says Mr Van de Vyver.

"Resembling a conventional troughed conveyor at its tail end where the material is loaded, the pipe conveyors' open belt is formed into a tubular shape as it passes through transition idlers, giving it its customary 'pipe conveyor' name."

This 'pipe' shape is retained along the full length of the conveyor and enables it to be curved through vertical and horizontal curves that are far tighter than is possible with troughed conveyors,

while at the same time retaining the high-capacity, long-distance capability of troughed conveyors.

At the terminal point the belt opens up for material to be discharged in the same way a troughed conveyor is discharged. On the return-side, the belt is also formed into a 'pipe' shape and can be used to transport material in the opposite direction. With the exception of the specialised belt carcass design, DemcoTECH's pipe conveyors make use of readily-available conventional conveyor components.

"Pipe conveyors are ideally suited to the cement industry as the material transported by a pipe conveyor is enclosed by the conveyor belt for most of its travel length. This obviates problems of material spillage on the carry- or return-sides, belt training, limitations to the angle of incline and horizontal curves and the need for multiple transfer points, often associated with conventional conveyors," says Mr Van de Vyver.

"A particular benefit of the DemcoTECH pipe conveyor is that these systems can be designed using a triangular tubular gantry fitted with a mobile maintenance trolley," he adds.

Two such travelling maintenance trolleys were supplied to Nova Cimangola for the pipe conveyor at its Luanda plant, each fully equipped with maintenance power sockets. These maintenance trolleys had to negotiate an incline of up to 15° while carrying four personnel together with spares and tools, presenting a number of design challenges.

The trolleys were manufactured and pretested in South Africa at a 16° inclination, before being containerised for transport to site. The trolleys are self-propelled by an on-board generator and include hydraulically-driven travel mechanisms for a high level of control. The trolley designs include a number of safety features such as fully-enclosed access facilities, emergency brake systems and heavy-duty traction control.

"All of the above considered, the pipe conveyor offers opportunities to reduce the number of conveyor flights, eliminate transfer points, minimise spillage, reduce the conveying distance and save total costs, while at the same time addressing the environmental requirements," concludes Mr Van de Vyver.

An expanding presence...

Bulk materials handling specialist DemcoTECH offers its clients a range of services from conveyor design to turnkey niche process plants, from concept to full, turnkey project completion. The company has carried out the design and engineering for large import/export port facilities, gold plants, diamond tailings disposal systems, manganese storage and export facilities, sampling plants and a wide range of other projects.

"Our clients are represented in a wide range of industries, including the power generation, cement, mining, metallurgy and manufacturing industries, as well as port facilities," states Paul Van de Vyver.

DemcoTECH has a growing international client list in Africa and in southeast Asia and is looking to "extend its reach into these regions and build upon past and existing bulk materials handling work for our clients," says Mr van de Vyver. "As part of this initiative, we have recently signed a co-operation agreement with a reputable engineering company in India," he adds.