

Skilful design ensures safe, efficient and environmentally friendly handling of fertilizer



Installing the grasshopper conveyors at Grindrod Terminals fertilizer facility at Maydon Wharf in Durban, South Africa.

Product loss and contamination during handling, transportation and storage are not only important cost considerations in the fertilizer sector, but also pose potential health and environmental pollution issues. Furthermore, dust generation, especially at transfer points, and loading on stockpiles, material degradation and huge corrosion problems are commonly encountered in the handling of fertilizer, requiring careful design of the materials handling systems and careful selection of materials and corrosion protection technology, notes DemcoTECH Engineering GM Paul van de Vyver.

As a renowned specialist in materials handling, DemcoTECH Engineering has a proven track record in designing systems and technologies to withstand the corrosion effects of fertilizer, as well as to minimize any negative impact on health, the environment and the product itself.

Providing a range of services from plant

reviews, audits and studies through to major turnkey projects, DemcoTECH recently assessed and audited a fertilizer storage and distribution facility for Bridgeport in Durban, South Africa, which was operating below specification. Recommendations were tabled and DemcoTECH was then contracted to implement these recommendations for rectifying the problem areas.

The facility comprises a truck offloading system and warehouses with conveyors stacking fertilizer onto a covered stockpile using an elevated tripper. As part of the global C. Steinweg Bridge group, the facility offers services in storage, handling, forwarding and chartering, as well as other commodity-related logistics services.

The upgrade included new ceramic-lined pulleys and modified chutes, a redesign of the truck offloading hopper discharge gates, retrofitting and refurbishing mechanical components, take ups, scraper

arrangement, spillage improvements, and crusher refurbishment, as well as the upgrade of the take-ups.

“A massive part of the damage repaired had been due to the flooding, whilst another issue identified was the severe corrosive effects of the fertilizer on all the structures,” says van de Vyver. “We worked with a specialist company on a complete corrosion protection refurbishment and also developed a plant corrosion maintenance programme — thus providing a complete solution.”

All of these recommendations were implemented over an 11-month period whilst the plant was operational.

In an earlier project, also in Durban, South Africa, DemcoTECH supplied a mobile ship-offloading facility, together with a full warehouse conveyor distribution system, for the fertilizer storage facility at Grindrod Terminals’ Maydon Wharf terminal. The system replaced a trucking

operation with no major impact on productivity and costs of the existing operation.

“The system comprises four 800tph [tonnes per hour], 1,050mm mobile, tyre-mounted conveyors, which are positioned on the quay at locations to suit the ship docking requirements and ranging up to 36m in length,” says van de Vyver. “Once the ships have been offloaded, by ship grab, the conveyors, also referred to as grasshopper conveyors, convey the fertilizer to a central 32m-long pivoting and retractable boom conveyor, which straddles the quayside.”

The existing warehouse roof structure was modified to incorporate five 98m-long, reversible, multi-point discharge shuttle conveyors. These conveyors feed multiple fertilizer product into the individual bays in the warehouse.

“The fully-sequenced automatic starting and stopping of the systems provide a seamless operation, with no blockages or hang-ups, and the ability to handle different types and grades of fertilizer, thus ensuring optimum efficiency,” says van de Vyver.

ADVANCED DESIGN

DemcoTECH’s materials handling expertise is underpinned by its access to the latest technologies, as well as its advanced testing and modelling/simulation tools to design efficient, fit-for-purpose handling systems.

“For an operation to be profitable, the entire materials handling system must be optimized and reliable, based on a thorough understanding of the interfaces between the various processes, as well as the specific material flow characteristics of the product to be conveyed and stored,” says van de Vyver. “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 Discrete Element Modelling skills, are underpinned by our in-house design ability, which are based on ISO and CEMA standards,” adds van de Vyver.

FULL SUITE OF STATE-OF-THE ART TECHNOLOGIES

DemcoTECH’s total solution for the storage and handling of bulk materials includes both enclosed and open storage, open and enclosed conveying systems, mobile conveyors and stackers on dumps, as well as ancillary equipment, such as dust



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suppression and control.

“At any point where material is moved or transferred, dust is generated, and therefore all equipment we design and install complies with international environmental and safety standards,” says van de Vyver.

“Systems such as warehouses and enclosed stockpiles are ideally suited to sectors such as the fertilizer industry, preventing contamination of product by the external environment and vice versa.

“Similarly, conveying technologies, such as the DemcoTECH AeroConveyor and pipe conveyor technologies provide an environmentally friendly and highly efficient solution for such industries, offering opportunities to reduce the number of conveyor flights, eliminate transfer points, minimize spillage, reduce the conveying distance and save total costs.

“For example, we made use of pipe conveyors and enclosed warehouse storage in the materials handling system we supplied for a four million tonnes per

annum multiple product terminal for Grindrod Terminals at Richards Bay in South Africa. In addition to rock and coal, the terminal handles phosphates and sulphur, two critical components in the fertilizer industry and providing similar design challenges in terms of corrosivity and dustiness.”

ABOUT DEMCOTECH

With extensive experience both in Africa and internationally, DemcoTECH offers 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. 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.