

Scrutinizing stockyard systems

TAKRAF's 62m Curved Boom Stacker ready for operation at a bulk terminal in Australia.



Louise Dodds-Ely

TAKRAF: stacking and reclaiming solutions tailored to specific needs

TAKRAF stockyard systems and machines ensure that machines efficiently operate at their desired performance levels and are sufficiently robust for a long service life.

While stackers and reclaimers are essential for bulk material handling and stockpiling, they present various challenges, such as the need for good co-ordination between machines, material flow and pile geometry, and the ability to withstand harsh weather and abrasive materials. As a result, TAKRAF Group, with its exceptional expertise in high capacity and complex bulk handling operations, is seeing ongoing strong demand for its stockyard solutions and machines that are custom-designed to the client's unique application and site conditions.

Operating across the globe, TAKRAF's track record covers industries from mining and general industry through to power generation and port handling, with services comprising the supply of complete integrated systems or of individual machines.

MINING SECTOR

Recent projects range from supply of a 1,993tph (tonnes per hour) radial stacker for stockpiling crushed platinum ore, delivered in under eight months to Ivanplats' Platreef Project in South Africa, to a complete stockyard system for a Guinean iron ore complex. The stockyard system is part of a contract from Rio Tinto for delivery of an integrated In Pit Crushing & Conveying (IPCC) and material handling system for the Simandou complex, one of the world's largest unexploited high-grade iron ore deposits. The stockyard comprises two stackers and two reclaimers, a complex conveyor system with transfer stations linking all parts of the system and two wagon loading stations with buffer silos. All stockyard equipment is designed with scalability in mind, laying the foundation for future expansions.

Other projects for the mining industry include a contract for a 7,200tph bucketwheel reclaimer from a repeat customer in South America, and an 8mtpa (million tonnes per annum) integrated crushing and washing plant for the

Khondbond iron ore mine in India. The contract for the plant, which produces both lumps and fines from run-of-mine iron ore, included the supply of machines for the final stacking and transfer sections.

PORT HANDLING SECTOR

TAKRAF replaced an existing stacker at a bulk terminal on Australia's East Coast. The rail-mounted stacker boasts an initial stacking capacity of 6,300tph and was designed from the outset to accommodate a peak volumetric rate of up to 10,700m³/h (equal to 9,600tph) for a scheduled future upgrade. This is ensured by unique design features that make it one of the most technically advanced, including a 2m-wide boom conveyor designed for a drive upgrade and a tripper car able to accommodate a wider stockyard conveyor. The massive 62m-long curved boom is one of the largest ever delivered.

TAKRAF has also recently supplied four full portal scraper reclaimers, in addition to three rail-mounted grab ship-unloaders, in a contract awarded by Bharat Heavy Electricals Limited (BHEL) for the Maitree

TAKRAF Portal Scraper Reclaimers under construction at the Maitree project in Bangladesh.



TAKRAF's 6,000tph Rail-mounted Stacker assembled on site in Mexico.



super thermal power project in Bangladesh. In Mexico, a 6,000tph rail-mounted stacker was replaced within the contractually required three days. Disassembly on site was able to be completed in just 2.5 days due to TAKRAF's technical experience, work planning and execution competencies.

POWER GENERATION SECTOR

Four portal reclaimers supplied to a new multi-commodity power plant in Japan are some of the largest built. Due to the redundancy required — two reclaimers are required to work on the same rail in the same warehouse — a dedicated safety and anti-collision system was implemented.

Each machine has a dedicated platform to carry a small bulldozer, which it can drop off at any location along the stockpile for cleaning purposes.



A bucket-wheel reclaimer ordered by a client in South America boasts a similar design, but a higher capacity, to a machine previously supplied by TAKRAF to a client in Australia (shown above).

INDUSTRIAL SECTOR

A urea bulk handling system for a mega fertilizer plant being established in Nigeria built upon the success of a previous handling system also supplied by TAKRAF for the project. The contract covered the handling of urea from receipt of the material from the granulation plant through to the storage yard, from where it is reclaimed for feeding a truck loading station. Handling urea in bulk storage poses unique challenges requiring special design considerations, such as completely sealing all conveyor galleries and transfer towers to avoid any moisture entry or exposure of the product to the outside environment. In addition, the portal



*TAKRAF Radial Stacker
in South Africa.*

scraper is provided with a 'de-lumper' to break the lumps that are formed during storage.

AFTERMARKET SUPPORT

As one of the largest and most experienced full-service suppliers of mining industry equipment, TAKRAF supports not only its

own machines over their full product lifecycle, but also those supplied by other OEMs. Specialized maintenance services are provided from across all the locations in which TAKRAF Group operates.

Particularly noteworthy are its refurbishments and upgrades of bulk material handling equipment such as stackers and

reclaimers (in all various forms). Based upon a thorough assessment of the existing status of the machine, TAKRAF teams develop an engineered solution to extend the lifetime, upgrade to the latest standards and/or increase capacity.

Innovation out of tradition — it pays to talk to a specialist.

Stretching the limits – conveyor belt elongation

Elongation is a commonly used but often misunderstood technical term applied to rubber conveyor belts, writes Rob van Oijen. The elongation (stretch properties) of a carcass is a more important influence on performance and longevity than many people may realize. Conveyor belt elongation properties are critical in determining how belts will react when subjected to varying stress levels. These stresses change along the length of the conveyor and across the width of the belt due to system influences such as tension, transitions, vertical and horizontal curves, turnovers, and crowned pulleys.

ELONGATION – WHAT IS IT AND WHY IS IT IMPORTANT?

Elongation is best defined as the change in length (stretch) of a belt when subjected to tensile stress. A distinction is made between elastic elongation, permanent elongation, and elongation at break. With each tensile stress below break load, the belt is subject to an elongation which, when the stress is relieved, partly recovers (elastic elongation) and partly remains (permanent elongation). The elongation at break is the amount of elongation at the



moment the belt breaks.

Using test method ISO 283, the amount of elongation is measured by placing a test piece under increasing tension. Elongation at the equivalent of 10% of the belt's stated tensile strength is measured, as well as the elongation at breaking load. Another test per ISO 9856 places a belt sample under a sinusoidal cyclic load that varies from 2 to 10% of the belt's nominal breaking strength. This tension range is a typical operating range for conveyor belts. After 200 cycles,

the amount of permanent elongation and the amount of elastic elongation produced by the force can be established.

It is important that a balance is achieved because the belt needs to be able to accommodate geometric changes such as pulleys and transitions. Provided that it is not excessive, a limited amount of elastic elongation is a requirement to accommodate strain differences. Permanent elongation is often unavoidable due to the nature of the reinforcement materials being