

# ICR article draft

## Modern-day minis

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In 2013 Africa imported some 13.1Mt of clinker, 8.9Mt of bagged cement and 3.2Mt of bulk cement in bulk carriers to meet its expanding demand<sup>1</sup>. To service future cement consumption, which is growing at 6-8 per cent annually, new production capacity mainly consists of large grinding plants rather than greenfield clinker production lines.

The preference is caused by several factors. Firstly, clinker imports offer several benefits over cement imports. The loading and unloading of cement takes place at around half the rate of clinker. As ships that bring in cement take longer to load and discharge, transportation costs of cement are significantly higher. In addition, cement is a perishable commodity and requires special warehousing and transport facilities. Clinker can be stored in the open, covered by plastic sheets. Moreover, as additives can be added to the clinker during cement grinding, following EN 197 standards, a higher volume of cement can be obtained. For instance, volcanic ash can be ground according to the clinker:volcanic ash:gypsum ratio of 62:35:3 and thus for every tonne of clinker, 1.6t of cement can be produced in a clinker grinding plant.

*With rapidly-expanding regional demand, Africa's cement producers are ramping up capacity. This is reflected in the building of large cement plants but in some areas, a smaller-scale approach may be more suitable. Modern Day Mini Grinding plants (MD-MGP) offer a way of encouraging new players to enter a market and bring new capacity online by overcoming transport and spare part constraints.*



A 300tpd mill can be fully dismantled and containerised

### Mini grinding plants

As large-scale clinker grinding plants are often not suited to local market requirements, mini grinding plants can provide a tailor-made solution to an area's cement needs.

However, mini grinding plants face some challenges:

- large-scale grinding plants are designed and manufactured exceeding industry standards and are subject to few major breakdowns, whereas mini cement plants are generally designed with financial costs

to meet the investor's pocket

- their economies of scale are not comparable to larger >1Mta plants
- Critical spares and back-up support are not available in most African countries. When a spare part is required, the sourcing and airlifting of the part into the country, let alone the plant, can take a month or longer. During this time, the mini grinding plant has to be shut down and is not producing any cement, but has to continue paying salaries, interest and other sundry expenses.

### Design basis and workmanship

To counter these challenges, Megatech International Pvt Ltd has undertaken major changes in the design, site selection requirements and implementation techniques of mini grinding plants. The company believes that its 'Modern day mini grinding plant' can hold its own when compared with larger cement grinding plants.

With an emphasis on robust and reliable equipment, Megatech's MD-MGPs are designed to operate 22hr per day, 330 days per year. The design workmanship and the selection of critical equipment



Megatech initially sends three containers containing a full workshop. The containers will double as an office and workshop until the buildings are ready



Layout of Dao Africa Ltd

is required to exceed cement industry standards.

In addition, Africa's transport challenges offered a learning curve. Megatech learnt from its experience in sending a cement mill on a flatbed trailer to the Port of Sudan from Nhava Sheva (Jawaharlal Nehru Port), India's largest container port, located south of Mumbai. The cement mill took five months to reach its destination. As it was unloaded in Dubai and most ships heading for Port of Sudan were unwilling to carry a non-standard cargo, the delivery of the mill was delayed. Flatbed trailers, with their higher axle loads than regular containers, require prior permissions in many African countries as there are many weak culverts and bridges on the highways. This is time consuming and holds the potential to cause very heavy cost over-runs that a MD-MGP owner can ill afford.

These considerations led to the design of the largest cement mill that can be transported in a 40ft container after fully dismantling it, ie a 300tpd unit.

To handle larger production runs, several mills are installed in tandem. For instance, in Uganda, Megatech is installing two 300tpd mills for Metro Cement Ltd and four such units for Dao Africa Ltd. This approach also provides the following benefits:

- In case of a major breakdown of one of the mills, at least 50 per cent of production will continue, enabling steady supply. This in turn will ensure that the day-to-day running expenses can be met by the plant and the small investor will not be burdened.
- Two or more mills offer the option to produce two grades of cement simultaneously to cater to market needs
- Spares are interchangeable, reducing the

costs of inventories. Two years of critical spares are included in the price of the mill.

To further reduce costs, the plant layout is designed so that all raw material flow is achieved by gravity and no silos are required. This reduces electrical power and overall costs. Moreover, with the very high cement demand in the region, a cement silo that can hold a day's production is sufficient and there is no need to further invest in a cement warehouse.

### Site selection

Finding the optimum site for the new finish grinding operation is an important factor for the future profitability of the clinker grinding plant. Megatech advises the following requirements for its mini plants:

- For a 600tpd capacity facility, 30,000m<sup>2</sup> of land is required.
- The site's water table should be at least 20ft below the ground level, even during the rainy season.
- Logistics play a key role so the site should be located near the clinker-importing port, the supply source of volcanic ash and the cement market.
- The plant also benefits from a location near the highway where there is electricity, mobile phone network coverage and internet connection. In addition, siting near a small township to house staff and supply their daily needs should be considered.



A cement mill on a flat bed trailer outside the Megatech factory

For example, Metro Cement Ltd (MCL) is located at Mbale, Uganda, some 35km from the Kapchorwa volcanic ash deposits and on the Mombasa-Kampala highway. Clinker is imported via Mombasa and final product is sent to the Kampala market.

### Implementation and economics

The basic grinding cost for the above plant (including packaging cost) has been estimated at US\$20/t. Furthermore, thanks to Uganda's considerable cement demand, the project owners can raise working capital from dealer deposits. This financial structure is expected to enable the directors of Metro Cement to reclaim the US\$4m investment in two years.

For a 600tpd mini plant such as the MCL unit, the commissioned cost is US\$4m. This results in an installed 0.198Mt capacity, the commissioned cost is ~US\$20/t, lower than the industry standards for a 1Mta grinding works.

This does not include the cost of DG sets as consistent power is available at Mbale. Power requirement is 2000kW at 6.6kV. In projects where there is no power available, Megatech installs three 1000kWh DG sets.

At MCL, Megatech is delivering the project on a turnkey basis, including the civil works, procurement, erection and commissioning. It will also provide key personnel to run the plant for the first year, with a capacity utilisation rate of 90 per cent in this period.

In terms of implementation, Megatech firstly sends three self-owned containers, including a fully-equipped workshop with lathes, drilling and bending machines, welding sets, tools and DG sets to the site so that on-site manufacturing of structures such as silos and ladders can commence from the third month. In addition, the site boundary will be fenced off with barbed wire. Once the factory is commissioned, MCL can cover the boundary with its own cement.

From site identification and purchase it takes around 10 months to start commercial production at a 600tpd mini plant.

### References

1. Lighthart, Ad. 'CEMENT AND CLINKER TRADE AROUND AFRICA A METHOD AND FACILITIES OVERVIEW'. 2014.