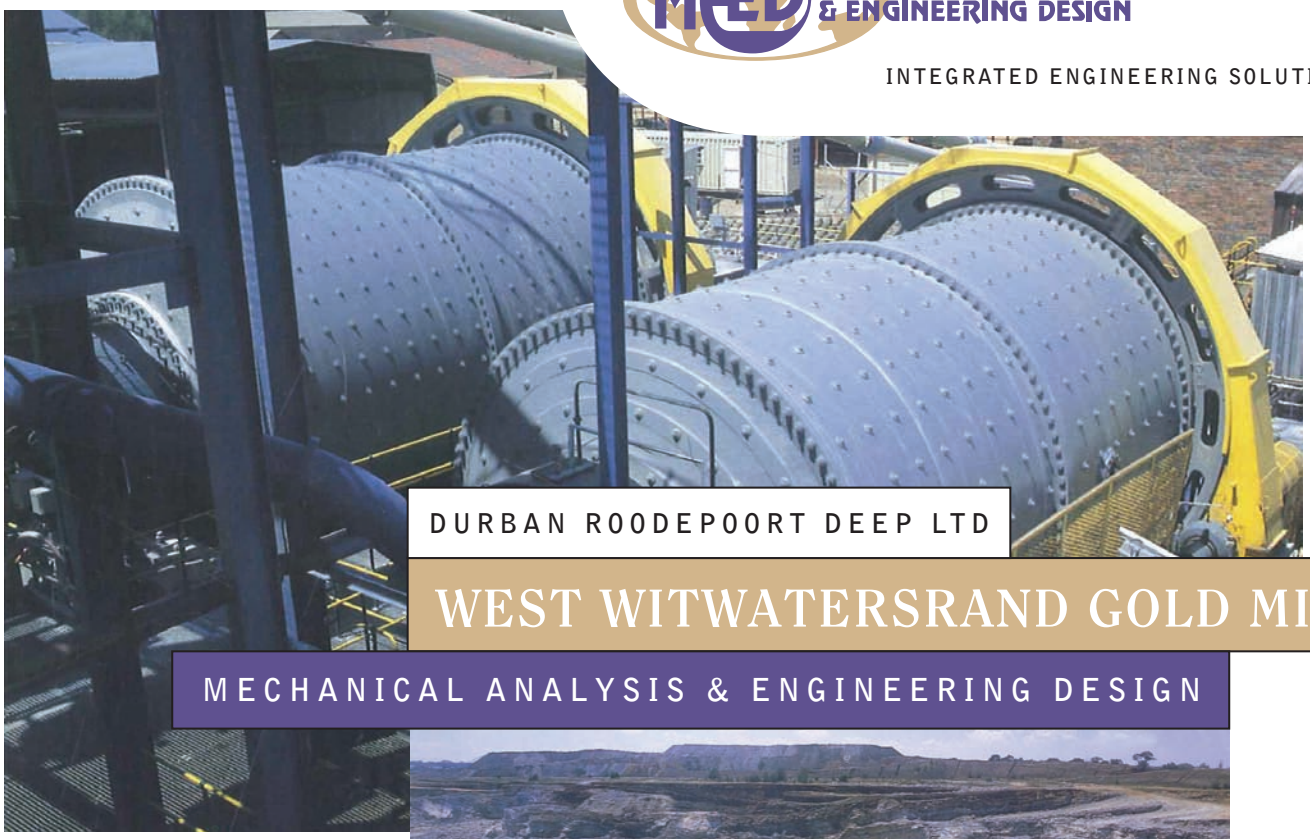
MECHANICAL ANALYSIS & ENGINEERING DESIGN

INTEGRATED ENGINEERING SOLUTIONS



DURBAN ROODEPOORT DEEP LTD

WEST WITWATERSRAND GOLD MINE

MECHANICAL ANALYSIS & ENGINEERING DESIGN

BACKGROUND

West Witwatersrand Gold Holdings, a wholly owned subsidiary of Durban Roodepoort Deep Limited, operates the country's largest opencast gold mine. The company has completed a significant upgrading to its milling and treatment facilities with the object of handling increased tonnages, reducing operating costs and enhancing its gold recovery potential.

The mine is now milling and treating three sources for gold recovery – hard rock from its opencast pit, hard rock from underground mining activities as well as a large tonnage of sand from the First West Gold North Sand Dump.

SCOPE OF WORK

West Witwatersrand Gold Mine's R55 million fast track expansion programme commenced in July 1995. The key element in the expansion scheme has been the installation of two new state-of-the-art mills.

A semi-autogenous mill handles 100 000 tons of hard rock per month – 80 000 tons from the open pit and 20 000 tons from underground mining. In addition, a ball mill handles a similar tonnage of sand. The mine's carbon-in-pulp plant recovers gold from the milled hard rock, while its extended and modified carbon-in-leach circuits treats the sand.

The following cogent reasons dictated the mine's decision to expand its operations, install new equipment and undertake modifications to the existing carbon-in-pulp plant:

Plant throughout had to be increased to improve overall profitability
Operating costs had to be reduced
Attain improved grades and gold recovery in the circuits through more efficient grinding techniques.

The Allis grind mills, supplied by Svedela, were manufactured in the United States. A 45 00 kW motor drives the 6m x 7,2m autogenous unit and a 3 500 kW motor the 5m x 8,2m ball mill both of which grind to minus 74 microns product size.

The treated residue is pumped for deposition to a dump site 5 km away which was developed at a cost of R5,5 million.

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The up-rated facilities will result in a 92 percent gold recovery from the hard rock treated and a 70 to 75 percent gold recovery from the sand material.

The cost of hard rock milled in the new autogenous facility represents a R6 per ton saving over the previous milling process, while the cost of sand pumped to the ball mill stands at R24 per ton.

Other sources of material in the area are being explored and investigated for processing.

Ball Mill Data	
Type	Svedala ball mill
Size	16,5 ft diameter x 27 ft long
Motor	ABB 3 500 kW
Gearbox	David Brown
Mill Speed	15 rpm (78,2% of Critical)
Discharge arrangement	Overflow
Mill lining	Rubber shellplates and lifters
Grinding media	Steel grinding balls
Duty	120 000 tpm of run-of-mine ore
Ore feedsize	Nominally minus 300 microns
Product Size	65 – 70% minus 74 microns

Sag Mill Data	
Type	Svedala semi-autogenous grinding mill
Size	20 ft diameter x 24 ft long
Motor	ABB 4 500 kW
Gearbox	David Brown
Mill Speed	13,42 rpm (77,2% of Critical)
Discharge arrangement	Grate
Mill lining	Rubber shellplates & "polymet lifters" (steel capped rubber)
Grinding media	Presently fully autogenous
Duty	100 000 tpm of run-of-mine ore
Ore feedsize	Minus 300 mm
Product Size	65 – 70% minus 74 microns

CREATIVE ENGINEERING OPTIMISATION

Ore throughput up
Operating costs down
Gold recovery efficiencies improved

MAED has a strategy unique to the South African mining industry. Each project is a managed partnership developed to save the industry significant amounts of capital.

Our project execution, without unnecessary overheads and extras, ensures that our direct costs are the lowest in the industry and well below that of our competitors.

By relying on our highly skilled engineers to negotiate many of the costs rather than tendering formally, we can cut the cost of plant significantly. To illustrate this point, on the West Witwatersrand upgrade project, MAED's direct project cost amounted to 5,2% of the total project cost. The original project cost, as budgeted by a major competitor amounted to R64,391 million, whereas the project was completed by MAED at R34,722 million.