

Simulation Helps Mining Company Develop New Market Strategy

The Company

The South African-based Exxaro Resources is a mining company. Exxaro's Grootegeluk opencast coal mine was established to supply coking coal for use in furnaces. A power station coal product was produced as a spin-off that later became the mine's major coal product. Grootegeluk handles about 47 million tons of run of mine (r.o.m.), which is beneficiated by five different plants. (Beneficiation is the process of separating waste material from coal products and is better known as the "washing" process.) At the time of the project the mine was developing a strategy of continuous improvement with a future target of 78 million tons of r.o.m. per year within the next five years.



The Challenges

Market trends indicated that Grootegeluk should diversify to supply metallurgical coal products in addition to the conventional coking coal and power station coal. To facilitate these new markets, modifications had to be made to existing plants, as well as the erection of two additional plants to produce 10% and 15% ash content metallurgical products. Market scenarios based on this new product mix also indicated that a new production strategy would be needed to fulfil demand and to optimize existing equipment fleets.

Grootegeluk needed a tool that could determine how to increase the performance of an isolated process in the

production chain, yet also determine in advance the influence of changes on the rest of the process. They chose Arena® simulation software to evaluate different production strategies and to satisfy the need for a decision-making tool.

The Deliverables

To achieve higher production performance, the following simulation studies were conducted by Grootegeluk simulation experts:

- Determine a maintenance strategy on blending beds vs. a bypass conveyor.
- Investigate an in-pit crusher and conveyor system vs. haul trucks to convey coal from the pit to the plants.
- Determine how an extra beneficiation plant would tie in with the existing mining operation.

Mine management needed confirmation of the plant design and requested more information on production sequence of coal benches, allocation of shovels with no increase in fleet size; increased size of haul truck fleet; size of buffer facility; and throughput.

The Results

The maintenance strategy project saved nearly US \$1.8 million, and the input crusher and conveyor system reduced the haul truck fleet by four trucks, signifying a savings in capital and operating costs and a difference in NPV (Net Present Value) of US \$5.5 million. The Arena model determined a bench shovel strategy that tied in with the existing pit operation, with no increase in shovel fleet size.

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