Simulation Analysis of the Coal Processing Plant of Resgen's Boikarabelo Mine

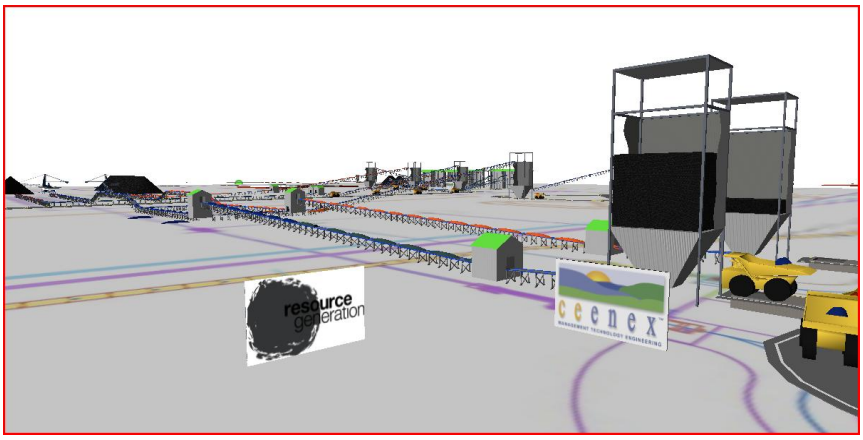
The Company

Resource Generation (Resgen) has coal interests in South Africa and Tasmania. Its current priority is to develop its planned Boikarabelo mine in the Waterberg region of South Africa where there are probable reserves of 744.8 million tonnes of coal on 35% of the company's tenements.

Coal is the major source of energy in South Africa. Production from existing mines is limited and there is expected to be an imbalance between supply and demand over the next ten years. The Waterberg coalfield contains approximately 40% of South Africa's remaining coal resource and is considered to be the main source of coal in the future.

The Boikarabelo coal seam is between 20 and 30 meters below the surface, ideally suited for low-cost, open-cut mining. The seam is between 120 and 130 meters thick, with zones of varying quality thermal and soft coking coal.

The Challenge



DRA is in the process of designing the coal processing plant for Resgen's Boikarabelo mine in the Lephalale area in Limpopo province. As part of the design and verification process, DRA has to determine the plant constraints and capabilities and determine the stockpile sizes for the run-of-mine (ROM) and product stockpiles.

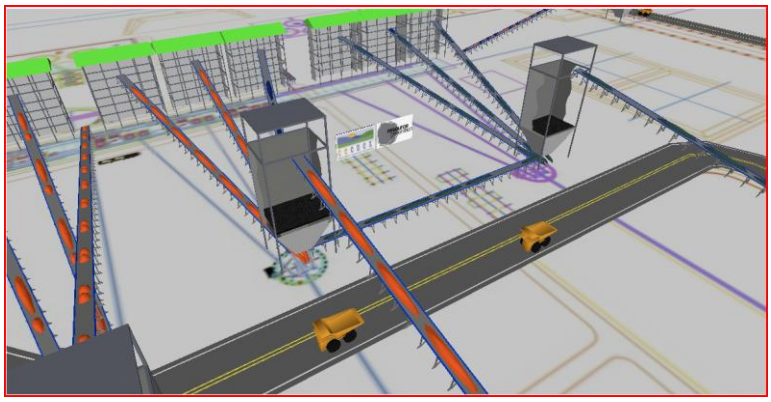
It is planned to operate the mine on a 24x7 schedule, excluding public holidays. The ROM is transported by trucks to the plant tipping stations and from there progress through various combinations of processing equipment (primary and secondary sizers, rotary breakers, storage bins, high- and low-grade plant modules, stockpiles and conveyors), eventually conveyed out by rail transport.

Furthermore, the processing plant is to be developed in two phases, with the first phase processing between 10 and 16 million tonnes per annum, leading up to between 34 and 42 million tonnes per annum in phase two.

Ceenex was requested to assist with advanced quantitative analysis of the processing plant and ancillary equipment in terms of the following:

1. Trucks tipping into primary crushers, in the front.

2. Discard bin, loading into trucks, filter cake stockpile with extraction according to specified profile and trains loaded out of the silo, in the back.
3. Crushing circuits broken down to capital equipment items (crusher, screen, conveyor etc).
4. DMS plant broken down to modules ("black boxes") with process capacity, availability, maintenance schedules etc.
5. The purpose of simulation is to confirm stockpile sizes (ROM and Product) as per supplied schematic block flow diagram.
6. Two phases were modeled.

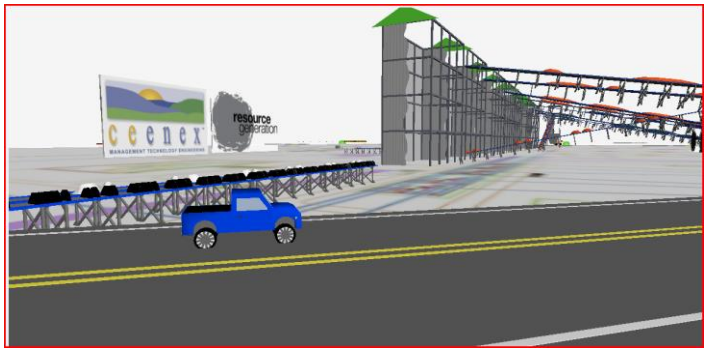


The Approach (Click for Video)
A dynamic simulation model was developed in Simio, driven by production from the mine plan, metallurgical properties of the coal, schedules and system constraints. The model also accounted for the cumulative effect of breakdowns, maintenance, schedules and stochastic variability on the size of the stockpiles and the expected throughput of the system over the life-of-mine (LOM).

The system was modeled as a push system, feeding whenever possible. Breakdowns were modeled on conveyors, sizers and plant modules and maintenance was planned on cycle.

Battery limits for the study were from trucks dumping into the ROM tip to the train leaving the loading bin. The simulation model also had to be expandable in future phases to include the detail bench mining according to the mine plan as well as the detail rail and port operations.

The Results
Several scenarios were run in order to determine the capability of the system and the stockpile size range required. The model highlighted some key system dynamics which would not be evident from static analysis, including:



- The effect of ROM coal mix between different products on the product stockpiles and plant feed.
- Maximum throughput rates for the different development phases.

- Key factors affecting plant processing capacity, including operating hours and buffers.
- Rail system sensitivities.
- Stockpile sizes over the LOM.

The 3D simulation model **(Click for Video)** allowed for the visualization of the plant design and ore flow through the system. The actual plant block plan served as a background for the model, with model objects placed according to actual design location. Apart from model validation through visualization, this proved valuable in conveying the model configuration to key stakeholders, therein substantiating model credibility.

Next steps in the project would be to further refine the key model input data (mine plan) and confirm processing plant capacities through further scenario analysis. Furthermore, the model needs to be expanded to take into account detail rail and port operations.

Advanced quantitative analysis and the application of the latest modeling tools and practices as noted in this case study, provided a means for Resgen to efficiently minimize risk and effectively maximize return on investment.

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About Resource Generation, Ltd.

Resource Generation is a public company dual listed on the Australian and Johannesburg Stock Exchanges, and is a new "energy resources company" specializing in the development of major energy related resources. It has coal interests in South Africa and Tasmania and its current priority is to develop its planned Boikarabelo mine in the Waterberg region of South Africa. To learn more, visit www.resgen.com.au.

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