

JKTech Specialist Consulting

Comminution Circuit Optimisation



Increase profits with improved throughput and product size distribution.

Simulation Using 

Comminution Circuit Optimisation

A plant optimisation study utilises real plant data and the JKSimMet software to develop a model of the plant which can be used to undertake a study of the circuit performance under varying conditions. The following steps are involved:

- Survey of the plant
- Laboratory testwork on ore samples
- Mass balancing
- Model fitting
- Simulation

During the *plant survey*, samples of all streams are collected, as well as other plant operating data including equipment dimensions, cyclone pressure and power draws. Samples are processed to determine % solids and size distributions of all streams.

Other *laboratory testwork* is performed on plant feed to determine the breakage characteristics of the ore. The plant survey data is *mass balanced* to provide a consistent data set.



The mass balanced survey data and ore breakage characteristics are then used to customise the models in the simulator.

This creates a set of parameters for each model which are 'tuned' or '*model-fitted*' so that the model simulates the performance of the real plant.

The plant *simulation* model thus produced is then used to develop and evaluate "what-if" scenarios for plant optimisation.

Comminution Circuit Design

For plant design, JKTech maintains an extensive database of model parameters, covering a wide range of operating conditions. Parameters from similar operations treating similar ore types are obtained from the database and used in the model of the proposed circuit. If possible, ore specific parameters are measured by testing actual samples of the ore.

Some typical tests performed on the ore to determine ore specific model parameters include:

- JK Drop Weight Tests
- Bond rod and ball mill Work Index tests
- SMC tests

The model developed is a valuable tool for evaluating design options.

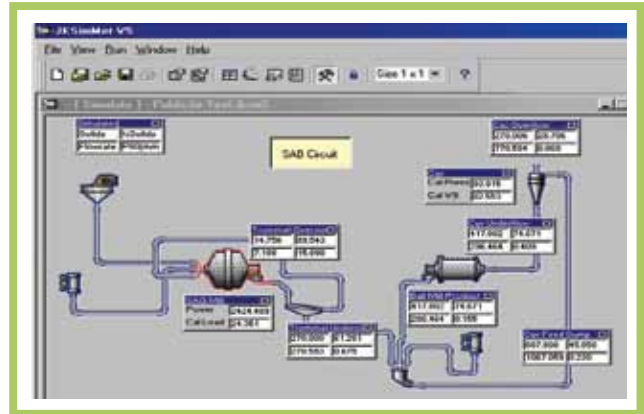


Benefits of Simulation

Plant trials to investigate different circuit configurations are time-consuming, costly and in many cases it is not possible to easily estimate the effect of potential changes (e.g. the installation of a recycle crusher).

Using a plant model to simulate different operating conditions enables the process of evaluating the various options to be much faster and more cost-effective.

Predicting the performance of a circuit through simulation will enable the development of a short-list of possible circuit modifications which can be engineered to satisfy the desired objectives.



JKTech can help

The team of comminution specialists at JKTech can help at any stage of your project:

- Preparation of a survey procedure document specific to your site which details sampling methods, data to be collected and preparation required. This will ensure that the data collected is complete and of the best quality possible.
- On-site assistance with surveys
- Assessment of survey data through mass balancing
- Model development from survey data for optimisation studies of existing plants
- Model development from the JKTech database for assessment of design options for proposed plants
- Simulation studies using plant models to predict plant performance under varying operating conditions



Predictions from **JK SimMet** include:

- Solids and liquid flowrates for all streams in the circuit
- Size distributions for all streams in the circuit
- Power draw for crushers and grinding mills
- Operating pressure for hydrocyclones
- Load volume in AG and SAG mills

JKSimMet predictions include enough information to allow suitable options to be identified and assessed.

Simulation projects have been conducted by JKTech at many operations in Australia and around the world.



JKTech Services

- Consulting (comminution, flotation, mineralogy, mining & geometallurgy)
- Process Mineralogy and In-House Instrument Analysis
- Specialist Software (JKSimMet, JKSimFloat, JKMultiBal, JKSimBlast)
- Specialist Equipment (ore breakage characterisation, flotation characterisation)
- Metallurgical Laboratory Services
- SMI Knowledge Transfer

Contact

Sebastian Tello
Comminution Group Manager

Telephone: +61 7 3346 5932

Facsimile: +61 7 3365 5900

Email: s.tello@jktech.com.au

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