Martlet Consultants

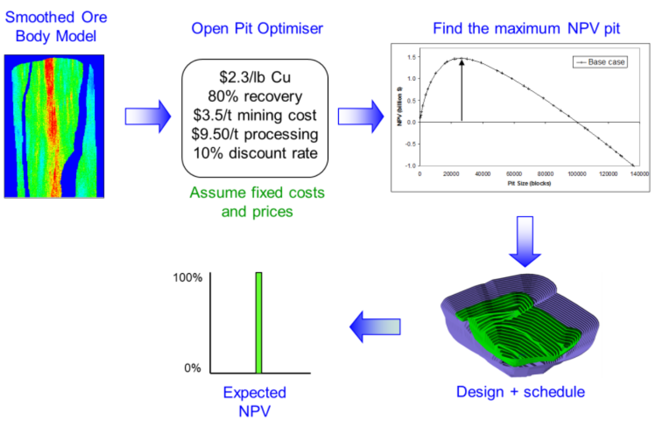
*Resource Evaluation Experts*

# Stress Test your Mine Plan!

In a capital-constrained financial climate, mining projects that can demonstrate superior financial returns with limited downside risk are more likely to obtain corporate and funding approval.

## Traditional Mine Planning

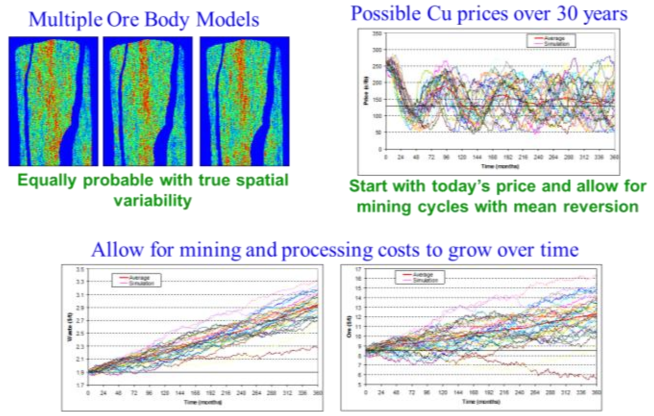
Typically, calculation of the financial return for a given mine plan relies on estimates of numerous parameters, including (but not restricted to) the mineral grades, extraction sequence and timing, mineral recovery, prevailing commodity price, and capital and operating costs.  The traditional mine planning approach is shown graphically below for the open pit environment.



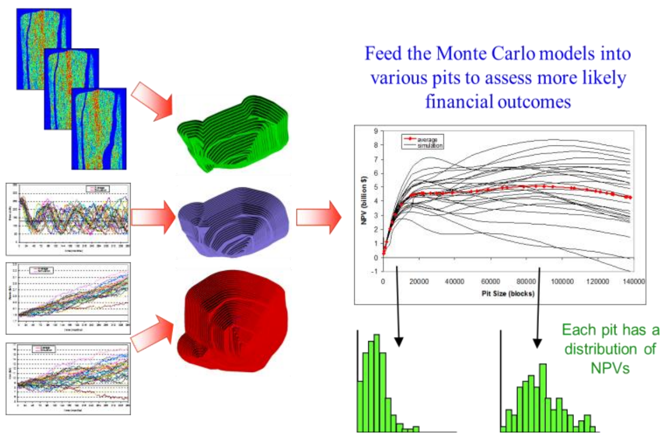

Sensitivity analysis involves independently varying each uncertain parameter by a fixed set of potential outcomes (eg ±5%, ±10% and ±20%), calculating the impact on the financial return, and visualising the outcomes with spider plots.  This approach: (1) will invariably underestimate the possibility of an undesirable or catastrophic financial outcome; and (2) does not account for the correlation between different parameters.

## Monte Carlo "Stress Test" Approach

Parameters used in mine planning are normally uncertain and, consequently, should be modelled stochastically by some form of Monte Carlo-based simulation technique.  For example, mineral grades by geostatistical conditional simulation, operating costs with a growth function, and commodity prices using a long-term mean reverting model that accounts for periodicity (price cycles), as shown below.




Martlet's approach is to combine a series of Monte Carlo-based simulation outcomes and "stress test" any given mine plan to quantify the likelihood of achieving a desirable financial return, as shown below.




These results can be further broken down by mining period to allow proactive management of residual project risk.  If the commodity price cycle has been modelled, then: (1) strategic evaluation of alternate project timing and staging can be assessed as discrete investment options; or (2) strategies for mitigating unacceptable revenue risk, such as forward selling, can be implemented.

If you would like to "stress test" your mine plan to support your investment decision, please contact: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