

CASE STUDY

Carbon14 Mine Scheduler

Title - Improving a business case in a capital constrained environment.

Overview

A large platinum producer in the Rustenburg area was in the process of sinking a shaft for a new capital project when the global financial crisis of 2008 required the re-evaluation of the project due to capital cash flow constraints.

The Business Challenge

The global financial crisis of 2008 necessitated a re-look at the business case of a proposed capital project within the Southern African mining industry.

The mine was designed to facilitate conventional mining and consisted of a two shaft system. Access to the mine would be achieved through two separate surface decline systems. The mine was designed with 9 levels with both shafts sinking concurrently yielding 3 million tons per annum steady state following a six year ramp up.

The project team was asked to investigate alternative options to the proposed design which would result in a mine schedule which reduced capital requirements in the short period.

The team was requested to investigate the following project focus areas:

- Reduction or postponement of capital requirements.
- Reduction in operating costs.
- Quantification of project risk due to lower development and stoping efficiencies and the resultant impact on project ramp up and operating expenditure.

Approach Taken

The global financial crisis necessitated that the investigation was completed within short period of time. As a result of this Cyest Corporation's Carbon14 Mine Scheduler was used to generate alternative production schedules for a different mining layout and configuration

based on longer level to level back lengths. It quantified the impact of low development and stoping efficiencies on production ramp up and operating costs and overall project value. This investigation could be done within 6 weeks due to the template and rules based approach inherent in Carbon14.

The following scenarios were tested:

- Increase the back lengths and reduce the number of levels from 9 to 7, thereby reducing establishment capital and development working costs.
- Test the impact of reduced development rates on production ramp up for each option.
- Test the impact of reduced stoping efficiencies on the overall operating costs and project value.

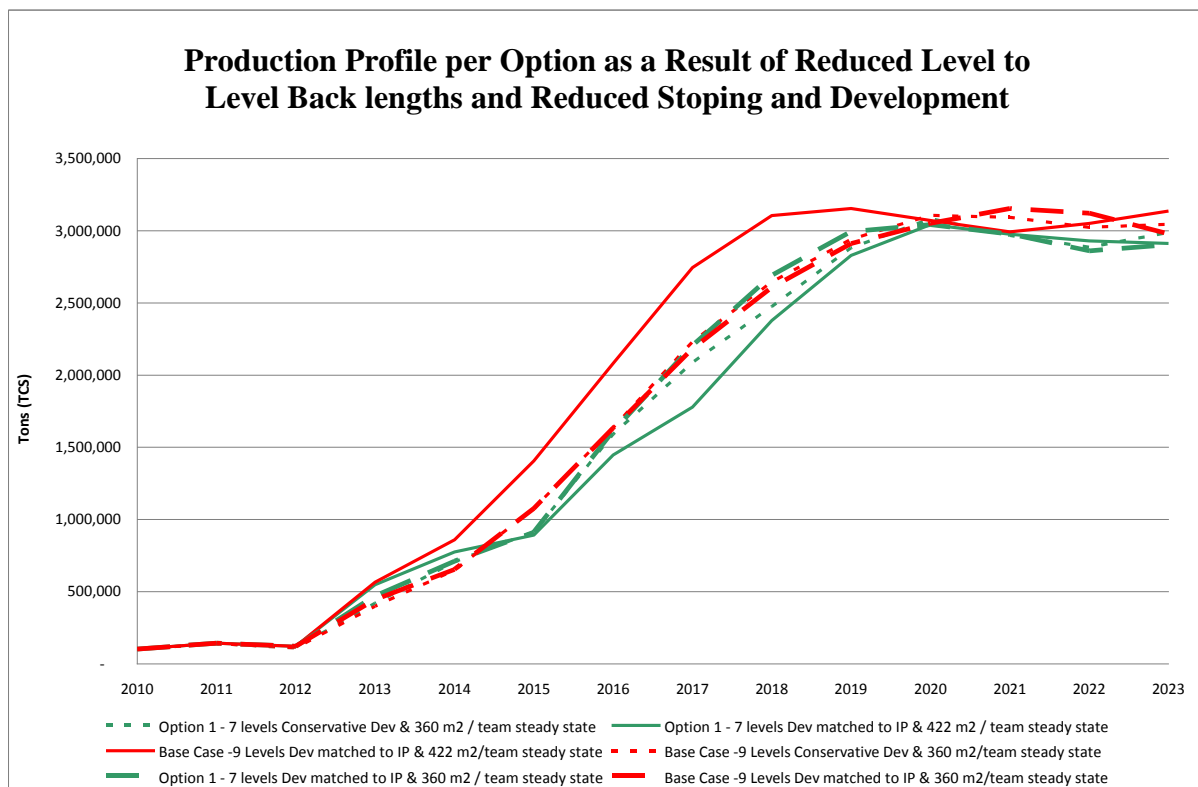
Six options were designed and scheduled for each of the two shafts. These options depicted all permutations of the varying development rates, the varying stoping rates, and the 7 or 9 level scenarios.

Using the Carbon14 Mine Scheduler two different mine layout scenarios were created with 7 and 9 levels respectively. These base scenarios were then varied by changing development and stoping rates, with all options scheduled to shaft capacity. This implied that with lower stoping rates more face length and therefore more half levels would be utilised to achieve the same shaft production.

Results

This exercise was undertaken and completed within 6 weeks using Carbon14 Mine Scheduler. For each scenario generated in Carbon14 Mine Scheduler, the production profiles, operating costs and NPV were calculated.

Below is an example of the production profile per each option demonstrating the different production ramp ups achievable.



The following was evident from the scenario analysis undertaken:

- The 7 level option ramps up 1-2 years slower than the 9 level option due to the increased level to level back lengths.
- Regardless of the stoping production rates, it was possible to man to full production.
- The higher development rates yielded slightly higher total annual production.
- The lower stoping rates had less of a tail as more half levels mined for longer.

Conclusion

The above information enabled the project team to recommend an option that would reduce overall project capital requirements and operating costs with the removal of two levels, however resulting in a 2 year delay in production ramp up. In addition, the project team could quantify the actual financial impact of the downside assumptions with respect to both development and stoping mining rates.

This exercise allowed the consideration of a delay in capital expenditure and production ramp-up and quantified its impact on project NPV. It provided options which considered

these capital and cash flow constraints. All options were scheduled within a 6 week period with 2 part-time schedulers.

This is a quantum improvement in the utilisation of traditional mine planning tools.