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CASE STUDY

Carbon14 Mine Scheduler

Title - Mothballed shaft re-evaluated

Overview

A major platinum producer on the eastern limb of the Bushveld Igneous Complex operated a deep level conventional mine using the scattered breast mining method. This mine was mothballed during the global financial crisis of 2008 due to the dramatic reduction in the platinum price and overall demand.

With the new increase in platinum demand and price the company were considering reopening the shaft.

Business Challenge

During the global financial crisis of 2008 an unprofitable shaft was mothballed until such time that it could be brought back into profitable production as a result of improved financial markets. When the platinum price recovered to slightly better levels, a Mining Engineer was tasked to evaluate at what production levels the shaft could be operated profitably again.

The following concerns expressed by Mine Management required quantification:

- Original production levels planned were too low to justify the shaft and infrastructure overhead costs.
- There was uncertainty regarding the ramp up period and desired level of production.
- Since there were several levels with limited remaining reserve, it was unclear the period of time any particular production level could be maintained.
- There were opinion differences regarding suitable crew efficiencies.
- Previous scheduling done resulted in a large unprofitable tail.

Approach Taken

The mine design was built in the Carbon14 Mine Scheduler based on previous mine design work completed in a graphical mine planning environment. Since the initial query revolved around m², tons ramp up, and sustainable production rates, not much attention was initially given to the grades expected.

Carbon14 Mine Scheduler allows for the level of detail and grades to be updated at a later stage once the schedule has been completed. The “historic unit” function was used in blocks that were partially mined to accurately reflect the remaining ground on each half level.

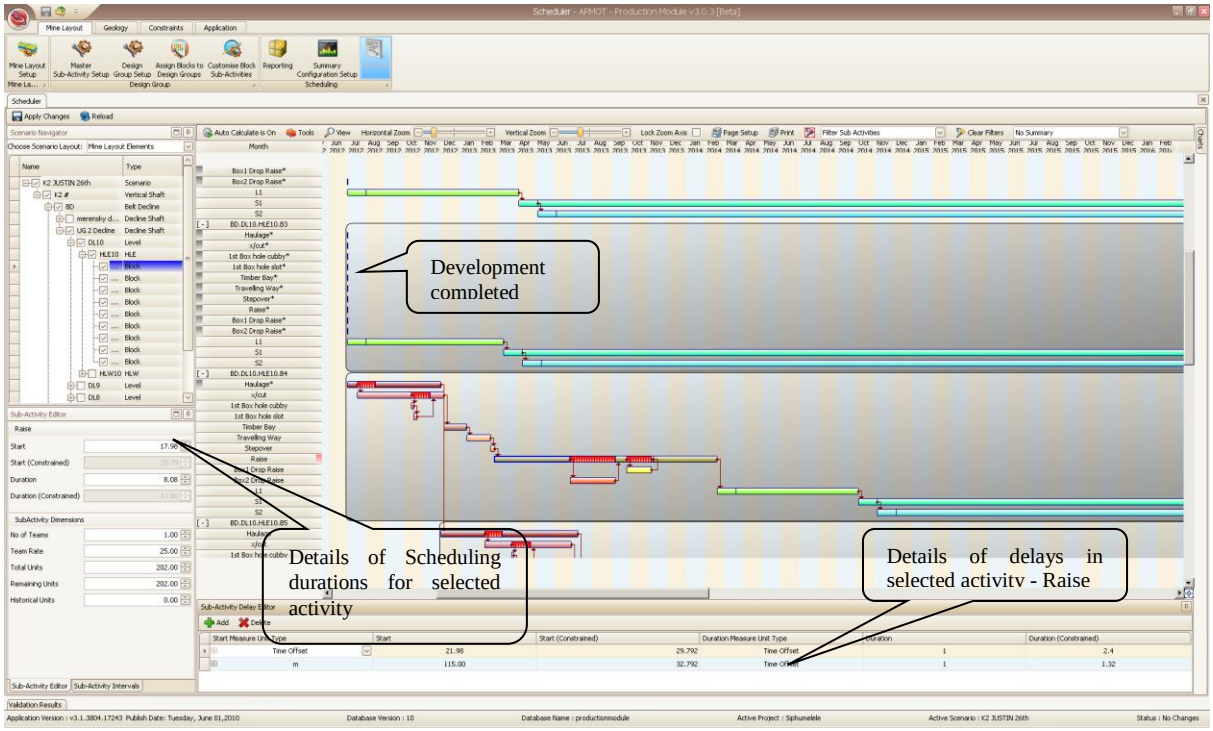
The Mining Engineer generated multiple scenarios in order to quantify the following:

- A suitable production level.
- An appropriate ramp-up period.
- Evaluating the impact of using several different crew efficiencies – was there enough face length for additional crews?
- Optimising the tail.

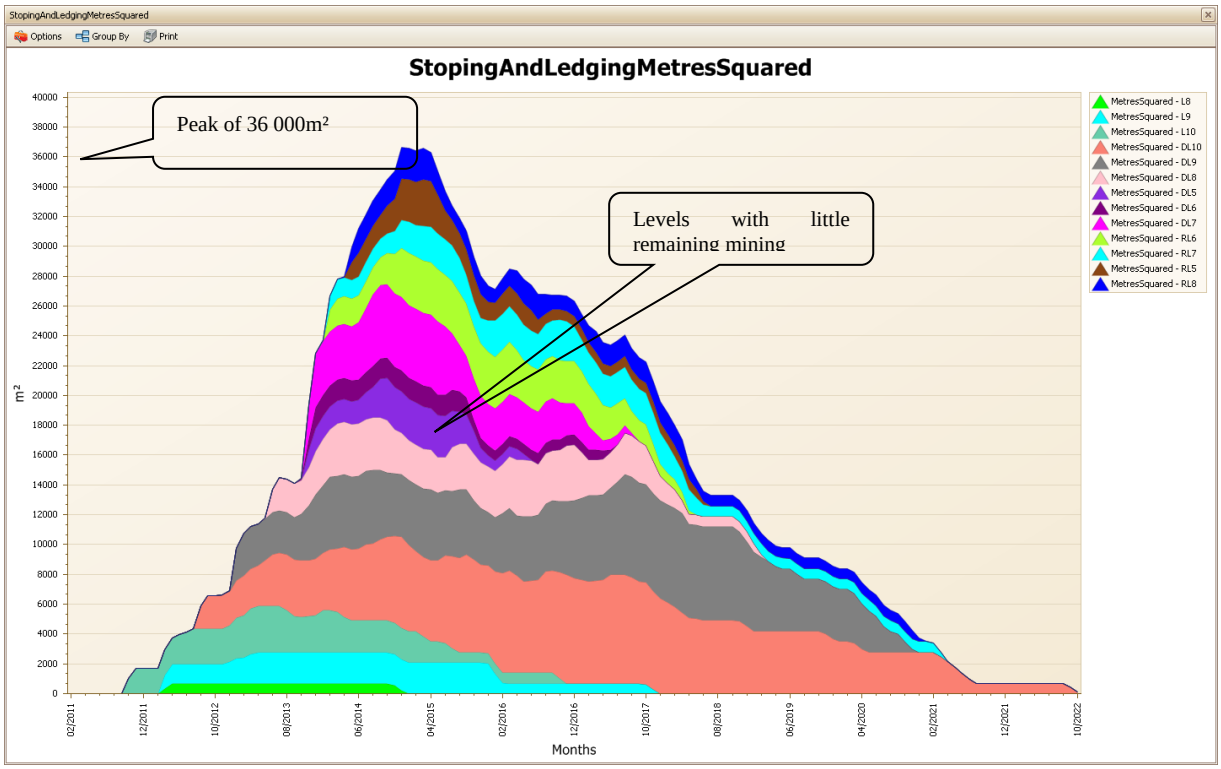
Results

The production schedule was completed in Carbon14 Mine Scheduler using the same mine design criteria as that used during operation. The screenshot on page 3 details some of the scheduling logic.

The resultant unconstrained natural production schedule is shown below. It is apparent that the peak production of 36,000 m² is not sustainable with several levels mining out very quickly.



Screenshot from Carbon14 Mine Scheduler showing the scheduling screen

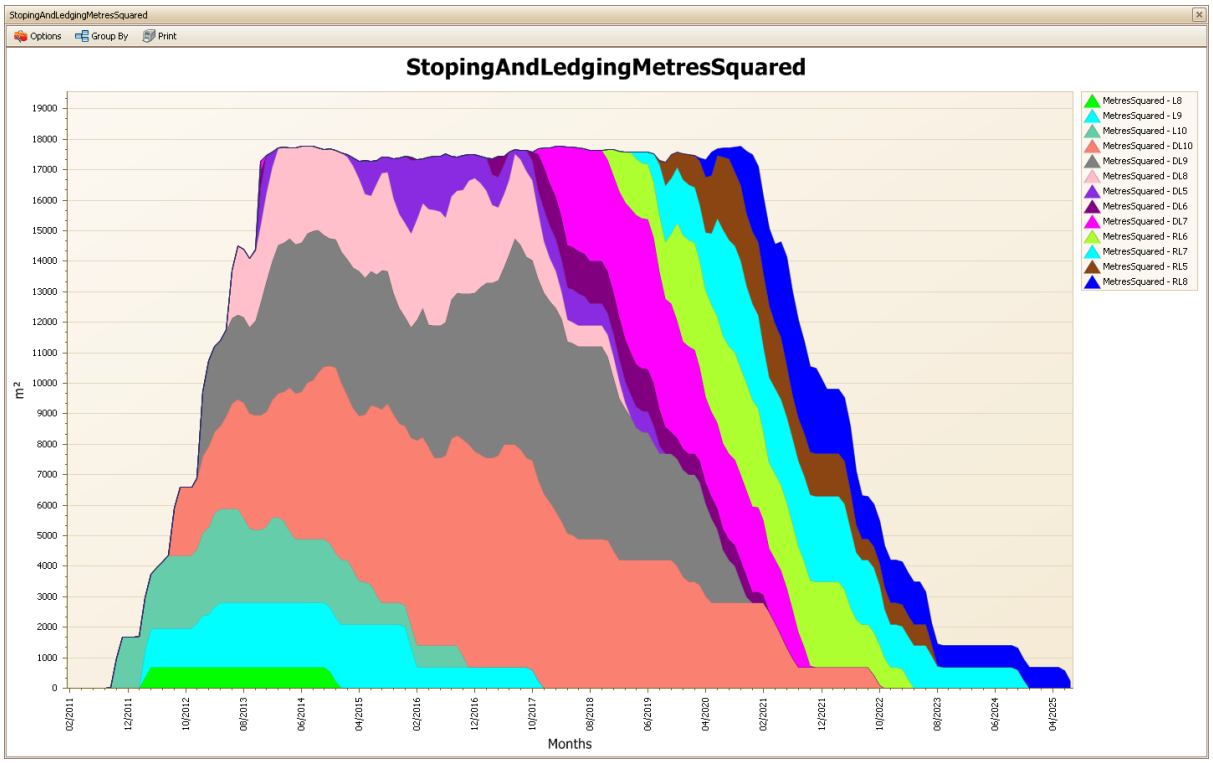


Screenshot from Carbon14 Mine Scheduler showing the stoping and ledging profile before resource levelling

The first step in optimising this schedule was to prioritise the long-life levels to minimise the tail. This can be achieved by dragging the levels in the scheduling screen or by specifying scheduling priorities when doing resource levelling.

This constrains the production schedule as shown below. It was decided to keep the higher grade Merensky levels at the beginning of the production profile. This allowed for these levels to be mined out quickly with these levels being closed off early on. The long life levels thereafter form the production base with the shorter life levels filling the gap as production tails off.

Once this profile was created it was possible to test different options around the crew efficiencies to determine whether enough face length would be available to accommodate more crews at a lower efficiency.



Screenshot from Carbon14 Mine Scheduler showing the stoping and ledging m^2 after resource levelling

Conclusion

From the final production profile it is evident that production can be maintained between 17,000-18,000 m² for more than seven years without a big tail.

Testing of different crew efficiency assumptions also allowed the Mining Engineer to present a production profile with greater confidence together with upside and downside scenarios for Management to quantify the actual impact.