SimMine Development Package – what it is and what can it do for you.

What is SimMine?

SimMine is a simulation tool for plan and simulating underground mine development. It is fully generic in the sense that you don't need any programming skills to set up your model and run it, you just import your center line in dxf format, create sections and set properties in the form of what activity cycle you will use to develop it, rock properties, face profile and so on. All the information you need to make your model to behave as the real mine.

After you define your plan, set priorities on sections, start dates, preferred end dates, predecessors (you always have logic predecessors). When your plan is done you begin to set up the vehicles you need/use and their capacities (time it takes to perform a activity, mechanical availability, preventive maintenance and muck more (the time it will take for a vehicle to tram is calculated from travel distance, vehicle speed and meetings).

You can also set up your development crew, and defined what kinds of activities they can perform and how many crew members you need to operate a vehicle.

If you want afterward you can set up different cost for vehicle, material and operator if you want to see the cost aspect.

When all this is don you can run your simulation and get results in form of a plan, how many development meters you done, utilization and bottlenecks among your vehicles or crew, cost and many more things.

What can SimMine do?

SimMine can be used for multiple purposes:

- Verify a plan you made in a planning tool
- Optimize the selection of equipment and other resources.
- Discover bottle necks in time, and analyze options to prevent any future issues due to unplanned/unknown bottlenecks
- Analyze which changes are required to reach your targets
- Loading and transport analyzes

If you use it as a verification of a plan made in another planning tool, you can set up this plan and simulate it too see if the development plan is achievable or not. If it is not you can test what you need to do to be able to achieve the plan, either by adding more vehicles or by changing the whey we do things by changing priorities you set for drifts or

work in different ways, or maybe the plan is not achievable and then you will now that and correct the plan you made.

You can also use it to see what you need to do if you want to increase meters that you need to develop every year or to be able to mange to get on your track if you have lacked behind.

I think there is now case we not can do with this program regarding simulation of development.

Examples of what this program have been used for today.

How should the mine prioritize the sections/drifts so they will be able to reach their development target and when in time they needed to add more vehicles and what kind of vehicles to add. This case has been a common case in multiple mines, where the mines range from being in a feasibility stage to a full-scale mine. The mines wanted to know all this information in advanced so they would not wake up with a problem on their neck, so we simulated their plan which was made in Mine 2-4D to find out if it was achievable or not and what they needed to do to make it achievable.

Other cases we looked at had the focus to increase the development meters that needs to be done every year and how they will archive that. We did focus on which vehicles they need to invest in or if it can be done with out investing in more vehicles. We find out where their bottlenecks were and by changing things how they was done they could increase enough meters per year with out making and investment in new vehicles.

Loading and transport analyzes, where the mines do want to know if their current fleet can still haul the ore when the mine gets deeper. Multiple variant of this have been done to analyze different aspects of it.

List of references

This table summarizes some references where SimMine have been used to assist in their decisions.

Project	Description
Kristineberg mine, Sweden	Analyses for bottlenecks and verification of changes
Zinkgruvan mine, Sweden	Transport analyses for different haulage strategies and required fleet to fulfil targets
Kiruna mine, Sweden	Lateral development analyses of 3 blocks for future increase in development productivity
Maseve Mine, South Africa	Development analysis with different possible scenarios, and a second Room and Pillar mining method and Ore handling model
Bathopele Mine, South Africa	Development analysis of the barrels and ledging with different possible scenarios
Venetia Mine, South Africa	Decline study; Method study, method optimization, development analysis with different scenarios
Platreefs Mine Study, South Africa	Decline and long hole stoping mining rates as well as shift optimization
Marula Mine, South Africa	Decline and strike mining rates analysis with various scenarios in the fleet and ore handling system
Venetia Mine, South Africa	Development analysis including level and long hole stoping mining rates and ore handling system capability determination with different throughput scenarios
Eland Mine, South Africa	Decline and ASD strike mining rates analysis and fleet optimization
Subika Mine Study, Ghana	Underground ramp/decline haulage logistics to identify design bottlenecks as well as determining optimum ramp capacity utilisation and vehicle fleet size requirements
Cadia East mine, Australia	Development analyses for feasibility study to identify priority order and possible development strategies
Wafi-Golpu mine, Papua New Guinea	Development scenarios for access ramp