

A 3D View of Mining Processes

By Nick Marinopoulos, Optimisation and Simulation Consulting (OPTSIM)

We are witnessing a revolution in the simulation modelling industry with the emergence of 3D animation technology. By using new and updated commercial simulation modelling packages, it is now possible to create a simulation model of any operating process, in any industry, and experience the interaction of all objects in three dimensions.

Over the past 20 years, simulation modelling has helped reduce infrastructure costs by testing the effectiveness of proposed enhancements before implementation. In the mining sector, simulation models are used to assist planning decisions for underground mines, truck-shovel operations, crushing and screening plants, processing plants, shipping, rail, ports and smelters.

By using simulation modelling to analyse complex mine operations, managers are given the ability to build more productive process systems and run everyday operations with less risk.

Animation then 3D

Early simulation models relied on text-based code and were time consuming to develop, validate and use. Then animation was added to allow simulation models to mimic a process, by allowing all objects in the model to move and behave like a miniature version of the real world on a computer screen. These 2D animations had a single fixed viewpoint, usually directly above the modelled process.

Now, with 3D animation it is possible to:

- Rotate, zoom in and view a mine site or plant from any angle.
- Attach a virtual camera to an object to visualise its progress throughout its entire operation.
- Enhance understanding of control and facility layout problems.
- Visualise implications of proposed decision alternatives in a true 3D environment.

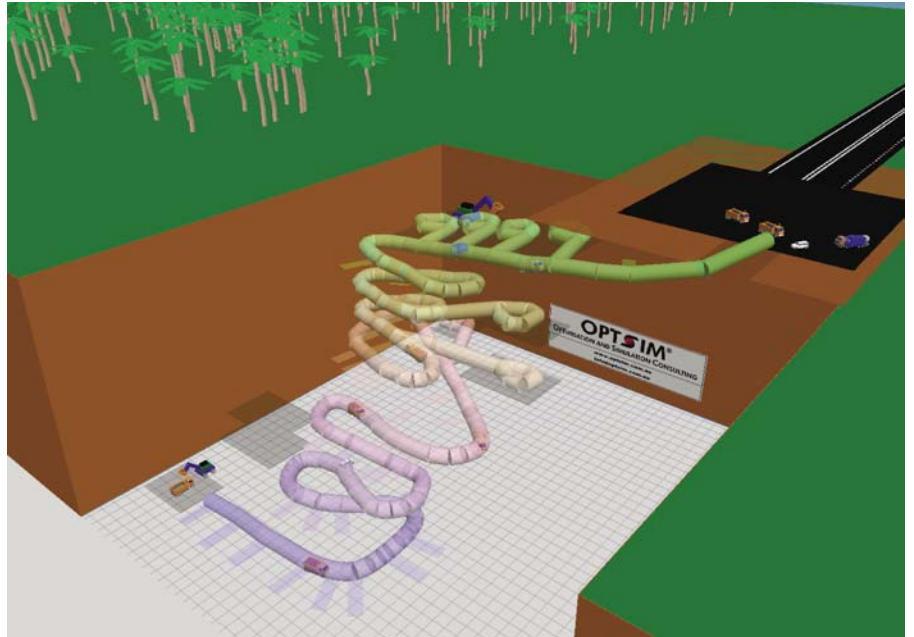


Figure 1: A distant 3D view of an underground mine showing the ground level and the decline.



Figure 2: An aerial 3D view of the same mine, at the same point in time, showing the decline and the portal of the mine.

In my 18 years of developing simulation models for mine sites and processing plants, the introduction of 3D animation is the most significant breakthrough for this powerful problem-solving methodology, as it enables the immediate visualisation of key operation and production issues.

Underground mines

An underground mine can be a difficult system to visualise as it can have hoists running vertically, roads running horizontally at many different levels and declines winding in and out from the surface to numerous gradients. However,

in 3D, the mining process is brought to life, as shown in figures 1, 2 and 3.

The ideal way to demonstrate the visualisation benefits of a 3D animation

is to see the animation in motion and to then gently move the viewpoint along any of the three physical axes, i.e. in-out, up-down and left-right. This is best done in a movie format, such as AVI, MPG or WMV.

We have developed an example of an underground mine 3D animation which can be downloaded at www.optsim.com.au/3D.html. This animation was developed using ARENA 3D software which can also be used to transform any existing ARENA simulation model into a three dimensional animation.

Three dimensional animations are also compatible with today's engineering design tools, such as AutoCAD and Microstation. These design packages work in 3D coordinates, so they can easily be exported to 3D animation packages.

Nick Marinopoulos: Ph: (03) 9421 6344
Email: nick@optsim.com.au ■

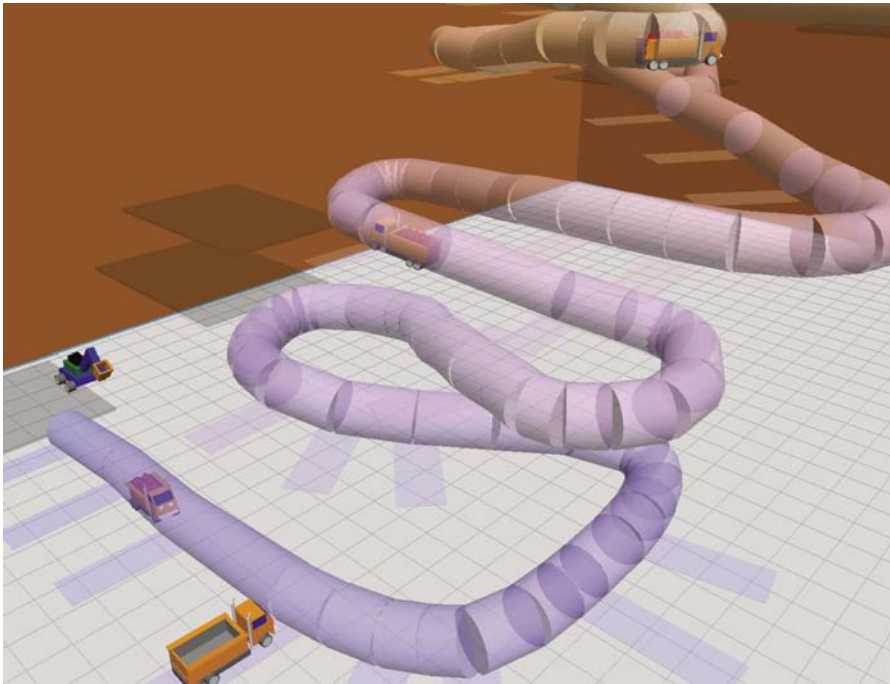


Figure 3. A close-up 3D view of the same mine, shows fully loaded trucks travelling up the decline and an empty truck waiting for a loaded truck to pass before returning to the loading point.