Strategic design of final landforms

3d-DigPlus animation software from Earth Technology helps operations reduce costs by considering rehabilitation as an integral part of life-of-mine planning.

Once a mine site has reached full term it is expected that all material is returned to its original state. Understanding the way landforms are defined is key to achieving conformance to rehabilitation guidelines.

There is no industry recognised approach to final landform design. An engineer will typically gravitate towards an angular straight line design. Landform construction is generally done in levels or lifts with each dump lift building on the previous one.

These landforms are often constrained within a nominated mine planning dump footprint in which trucks are able to dump waste. The material in the lifts rills down at an angle of repose, which is usually well above rehabilitation slope requirements. Realistically, a fully constructed landform will not look natural or meet sustainable final landform slope requirements.

This approach lacks foresight and proper planning strategies. The default is to keep constructing a landform as material becomes available without consideration of the end result.

> Incorporating progressive rehabilitation into everyday operations using existing fleet capacity for landform construction brings a significant and easily identifiable cost saving.

Mobilising additional equipment dedicated to rehabilitation efforts is expensive. Historically the design of final landform construction, cut and fill balances, material identification and placement has been a time intensive process.

Calculating final landforms based on target slope angles was traditionally done on a range of cross-sections. This method can be highly inaccurate, and making material balance 100% is near impossible and very subjective. It becomes difficult to understand cut and fill requirements for final landforms and increases the margin for error in calculating rehabilitation costs.

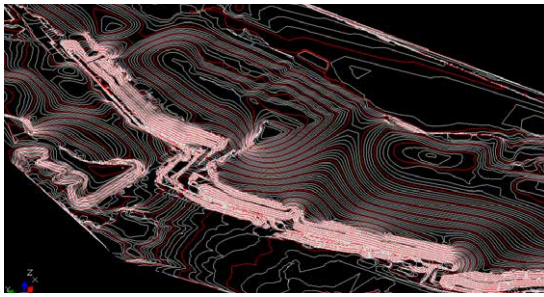
Mine planning technology is evolving to a more all-round approach to life-of-mine (LOM) planning. Engineering design of 'natural' final landforms through 3d-DigPlus reshaping methods is delivering results.

The ability to generate rolling natural landform shapes with rapid turnaround for testing multiple scenarios is incredibly valuable to LOM planning. Industry wants an easily auditable and reproducible reshaping process to increase the accuracy of data.

3d-DigPlus allows for calculation of necessary push directions, distances and associated volumes to achieve a desired final landform. This is key to quantifying costs of landform construction and maintenance and identifying savings.

Different regulatory guidelines for mine closure and final landform rehabilitation nationwide lead to inconsistent approaches to rehabilitation. New strategies are redefining guidelines based on key premises:

- Soil characterisation is unique at each site.
- Stable final landform slope targets are based on site specific soil erodibility curves.



Rolling natural final landforms generated in 3d-DigPlus (above) and push distance arcs indicating material movement directions (below)

Understanding target slope criteria through soil characterisation is key to understanding associated costs, as is a collaborative upfront approach to LOM planning using new technology.

3d-DigPlus is one of the best and most accurate tools available for controlling landform target slopes and generating meaningful results. The principle is simple: start with the end in mind.

Thanks to Sara Wodyk
Landform Planning Specialist
Raine & Associates, Brisbane

3d-Dig software allows full 3D simulation across excavation, dump and machine performance. The tools are ideal for dragline, truck and shovel, and dozer movements for coal and iron or strip mining operations. 3d-DigPlus is now available from Maptek.
Email solutions@maptek.com