Use Case

Hacking mining with Spatial Data

The world around us is going spatial. From built-in GPSes to self-driving cars, we increasingly create, use and interpret spatial information. The mining industry is no different, and spatially contextualizing mining data will change the way we interpret and use that data. The visualization of naturally interconnected data sets in a single 3D environment introduces new application and value from the same old data.

WHY SPATIAL?

In most mines, overbreak and underbreak measurements are used to determine dilution.
Overbreak is represented as the difference between the intended dimension of an excavation and it's actual dimensions. With small variances to cater for client need, the formula is quite simple:

$$\frac{\text{Planned Height x Planned Width}}{\text{Actual Height x Actual Width}} \times \frac{100}{1}$$

In most cases, if the result is between 90% and 110% no exception is reported (the tolerances of companies may differ). This solution works well in the situation illustrated at the bottom. The deviation from the planned layout is not excessive. Yet the measurement of dilution is not the only use of this data! At point A in diagram 1, the planned rail infrastructure will fit well in the actual excavation. However, point A also represents a potential safety hazard. Non-spatial solutions do not show or highlight these hazards.

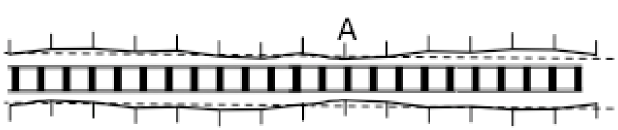

Figure 1: Potential safety hazard

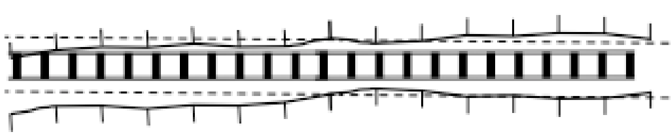

Figure 2: Rail instalation diagram

HOW SPATIAL IS SAFER:

Using Overbreak and Underbreak information in this way is only possible if you are able to integrate and spatially visualize and analyze both planning, infrastructure and survey data all in one place. This approach highlights the spatial relationship between the data set and the unacceptable safety risk that emerges.

HOW SPATIAL IS BETTER:

The following image shows an example where it will be impossible to install the infrastructure (rails) to specifications. Every turn or bend requires extra maintenace for the rails, and has the potential of a derailment, causing delays in production. As the first case explained, traditional overbreak and underbreak reports would not have show any exceptions, as the total deviation is less than the 10% threshold applied by the company, both cases is unacceptable practice which breaches safety and infrastructure protocols.

Non-spatial solutions won't highlight any of these problems and reflect current thinking and reporting paradigms. By introducing MineRP's spatial visualization solutions, all the related information from planning,engineering and survey can be spatially integrated. Spatial analysis alerted the mine of the obvious deficiencies in its development network.

IMPLEMENTATION

Both these applications demonstrates the natural dependency of the mining industry on spatially contextualized information. Merely showing adherence to numerical standards and protocols fails to yield the full value unlocked by visualizing the exact same data in 3D, together with naturally associated information.

Combining spatial intelligence with the ability to scan excavations instead of offsetting them, unlocks a rich intelligence – where data is placed in a spatial context enhanced with knowledge of the impact of the execution – thereby improving decision-making.

Figures 3 and 4 shares an example of how 3D vizualisation and analysis enables an underground gold mine for the purpose of determining if their tunnel-boring machine will fit inside an existing excavation. They have 2 sizes of borers. In the first example (fig 3) it is clear that the small borer will fit in the excavation with minimal effort or slipping. The red profile at the start indicates the size of the borer, it can be seen that at the end of the tunnel the borer won't fit. However the client is confident that the borer is flexible enough to be elevated at these intersections.

The second example (fig 4) illustrates the fit of the larger borer. In this example it is clear that a huge amount of slipping will have to be done in order for the machine to fit. This would require retrofitting infrastructure in a pre-developed excavation. If the development was designed with the boring machines in mind, the design would have been different.

The principle is that decision-making will be enhanced and latent design problems could have been avoided or rectified earlier.

Figure 3::sing 3D visualization to determine tunnel-boring posibilities

MineRP's SPATIAL SOLUTION

The capabilities introduced by spatial inspection and (if necessary) analysis (either manual or automated), introduce several opportunities for quality improvements in the mining industry. As mines are exposed to the advantages of the new technology and factor that into their thinking, they create a new, more productive, and safer world with very little cost or effort, compared to consequences of continuing the way they do.

> "Spatial Dash allows you to make better and quicker business decisions by visually relating and analysing mining technical information from a variety of disciplines"

The MineRP spatial integration platform provides a means to integrate and visualize all your mining data sets in a single spatial data source - without the need to change the geology, planning and survey systems you currently use. Both 2D and 3D spatial dashboards will allow you to visually inspect all data in its spatial context, as well as create automated rules to enable the system to highlight problem areas not otherwise visible.

WANT TO KNOW MORE?

Visit our website at www.minerp.com to find out more about MineRP' spatial integration platforms and other mining solutions

Figure 4