



Case Study

Mining

Remote Monitoring of Iron Ore Mining Pits with Stack Insight

Challenge

The Sishen iron ore mine in South Africa is one of the largest open pit mines in the world, with an area of more than 100km². It is owned and operated by Kumba Iron Ore, a business unit of Anglo American, a major supplier of high-quality iron ore to the global steel industry. Iron ore is a basic element in the production of steel, which is important for civil engineering applications.

To meet the demands placed on the mining and surveying team, the company requires accurate and timely information for reviewing and planning activities. Important decisions must be made on a regular basis about new blasting and excavation sites, strategic equipment placement, material movement and waste dump locations, whilst keeping an eye on environmental change and compliance.

Satellite imagery is the solution for mining companies: within a short timescale, it provides up-to-date, accurate and detailed information about the area of interest.

Pinkmatter Solutions, headquartered in South Africa and specialised in geo-information software design and satellite image processing, has leveraged its partnership with Airbus Defence and Space to provide Kumba with a satellite-based solution to follow the evolution of the mine, and efficiently manage iron ore extraction.



"The weekly update issued by Airbus Defence and Space and Pinkmatter Solutions, which is not time-consuming, represents a high-value benefit for our resources management. We save time, people and money."

Johan van Heerden, Principal Mine Surveyor, Kumba

Solution & Results

Every week, Pinkmatter receives Pléiades images over the 100km² mining area to be monitored, within a few hours after acquisition and the data being made available. Pinkmatter's FarEarth system automatically orthorectifies the images using custom, high-precision Ground Control Points (GCP's). The precision ortho product is produced in the mine's custom projection so that it can be used in their own Computer-Aided Design (CAD) software.

In just one day, Kumba had all the updated geographic information to make informed decisions for optimal production and resource allocation. Weekly orthorectified images are used to monitor the progress of excavation operations and in the planning of the week's activities, including the nature and location of machinery and other resource deployments. The Airbus Defence and Space imagery, along with Pinkmatter's precision processing, is utilised by

Kumba to monitor infrastructure, plan operations, monitor excavation and dump sites, track progress, and eventually provide a better overall visualisation of the mine.

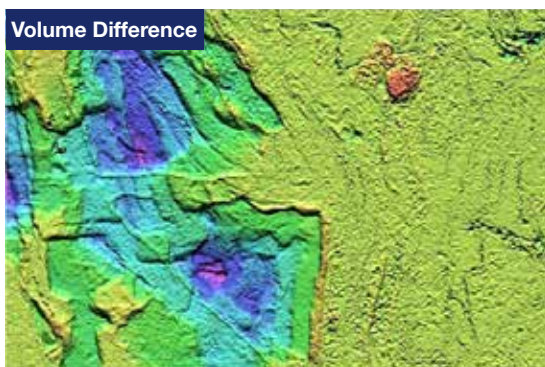
The tangible results delivered by the Partnership between Pinkmatter and Airbus Defence and Space have been so valuable that Kumba has implemented the same solution for another mine.

Benefits

- Time-critical decision-making: regular revisit times of the Pléiades satellites provide Kumba with a set of reliable information weekly.
- Global access to remote areas: satellite data provides world-wide information regardless of the accessibility of a site. The need for human resources on-site is also reduced when using satellite data.
- Cost-effective solution: lower cost of satellite data provides comparative results to LIDAR-based volumetric products. The volume difference between LIDAR measurements and Pléiades-based elevation models amounted to less than 2% at Sishen.



January 2015 March 2015 May 2015
Time-series over the mine for a period of five months.



Comparison between 2014 and 2016 DSM over the mine, with a volume-difference product at the bottom. The difference products shows areas of volume (elevation) increase as red, and decrease as blue.

- 🔍 **Challenge** Need for accurate and timely information to support reviewing and planning activities.
- 💡 **Solution & Results** Using rapidly delivered 50cm imagery products from Pléiades provides the detail and accuracy needed to effectively manage excavation operations.
- ✅ **Benefits** Supports time-critical decision-making with remote information even in the most inaccessible areas worldwide.

Did you know?

Volumetric calculation is also achievable with Airbus Defence and Space satellite imagery, enabling further applications for Kumba. Occasional stereo acquisitions are currently carried out, are then processed by Pinkmatter to produce high accuracy elevation models, allowing for volume and volume change calculations.

Solution Description

Stack Insight is a service that enables the identification of changes on the field and is able to remotely calculate the volume of your stacks and piles, with just a few mouse clicks. This service is based on very high-resolution 50cm imagery products from Pléiades optical satellites.

Organisations Involved



Pinkmatter Solutions is a software company focused on design and development of tools for the automated extraction of information and intelligence from satellite imagery. They are Airbus Defense and Space privileged partner.



Kumba Iron Ore Limited, a member of the Anglo American plc group, is a leading value-adding supplier of high quality iron ore to the global steel industry. Kumba produces iron ore in South Africa at Sishen mine and its Kolomela mine in the Northern Cape Province. Kumba exports iron ore to customers in a range of geographical locations around the globe including China, Japan, Korea and a number of countries in Europe and the Middle East.
www.angloamericankumba.com