

Context

In the metallurgy industry, safety and time are at the heart of all concerns. Especially, the volume of ore moved in and out every day by the suppliers is a key line in the financial balance of every industrial in this field. Knowing that the invoices are based on a *per truck* unit, it is crucial for an operator to track the volume changes with time. And the land surveyor Jean-Pierre Dayan (Martigues - France) knows it better than anyone else. As a supplier to Arcelor-Mittal, he has been surveying their ore stockpiles for years with his GPS and total station. Early 2014, his customer requested him to quickly find a non disruptive way to survey the cubature of the stockpiles on the site. Arcelor-Mittal objective was double: avoid having someone climbing on the heap for safety reasons, as well as reduce interruptions in the production, for planning and financial purposes. Jean-Pierre Dayan decided to jump on the bandwagon of the UAV train, and presented an ideal solution for stockpiles volume measurement using his newly acquired Novadem UAV, and



Smart3DCapture Advanced Edition. This new way of working improved his workflow on many aspects, including speed, accuracy and security.

UAV acquisition and post-processing

Jean-Pierre Dayan is equipped with an OLYMPUS ZX-1 DSLR camera mounted on a U130, multi-copter drone from Novadem. The drone is operated from an altitude of 100m to get an average ground resolution of 2 to 5 cm per pixel. In addition, ground control points are surveyed with a LEICA GPS providing a precision of a few centimeters along the X, Y and Z axis.

After collecting the data, the geo-tagged photos are imported in Smart3DCapture. The software allows to quickly perform the aerotriangulation (i.e. automatically finding the relative position and orientation of photos) and the reconstruction of the georeferenced 3D model of the site.

The 3D mesh is then imported in their standard measurement tool where the volume calculation is performed.

the two workflows in parallel, Jean-Pierre Dayan observed a **difference of less than 1%** on the measured volumes, hence validating the process.

Finally a great advantage of using drone for stockpile measurements is security. A lot of activity involving dumpers, excavators and other large machines animate the site relentlessly. Surveying from the sky allows the local staff to keep working without interruption and prevent the surveyor from an unexpected encounter with a 50 tons dumper.

Key Indicators :



- Surveying and processing time divided by 5
- 3D model precision of 5cm
- <1% error on volume measurements



Advantages of this new workflow

Jean-Pierre Dayan particularly insists on the time being saved using this method. While their former acquisition method required 8 hours on the field, only 30 minutes are required to perform the drone acquisition on a standard site. The time saved back at the office for post-processing is also important. Where 4 hours were required for the drawing and calculation, only 2 are required by using Smart3DCapture.

Another point worth highlighting is the precision of the results. After a couple of month of testing and conducting

Success story

The success of this operation has opened new business opportunities For M. Dayan, as Arcelor-Mittal asked him to extend this method in other centers.