



Building the future of quarry monitoring — using drones to boost safety & survey efficiency

In 2015, French quarry operator Groupe CB turned to drone data analytics expert Redbird to provide accurate, cloud-based geospatial data across nine of its sites. This new, aerial approach led to a major improvement in on-site safety, a five-fold reduction in survey costs, plus an increase in the depth of Groupe CB's topographic data, providing a clear vision of the future of quarry data management.

Groupe CB (Carrières du Boulonnais) has been exploiting minerals through industrial processing for over four generations and is a major player in industrial and public works, as well as owner of the largest individual quarry in France.

Slow, dangerous work

The crucial work of **Groupe CB's** surveying teams is to survey stockpiles at each of the company's quarries and to monitor the height of each quarry's walls to ensure compliance with local safety regulations. Traditionally, this would be achieved by surveyors traversing these sites with terrestrial GPS equipment in order to measure the required X, Y, Z data. However this approach was a dangerous undertaking for these staff.

“ In the past, monitoring our quarries used to be a complex job ”

Therefore, in 2015, Groupe CB decided to try a different approach: it partnered with **Redbird**. The company, a leading quarry data analytics expert, would conduct aerial drone surveys of nine Groupe CB quarries each month, before providing the full dataset for each within 24 hours, fully accessible online via Redbird's cloud solution.

“In the past, monitoring our quarries used to be a complex job,” explains Vincent Amossé, the Deputy CEO of Groupe CB's Aggregates Division. “We started working with Redbird because

of their reliable, user-friendly cloud data interface and out of concern for the safety of our surveyors.”

Prior to Redbird and drone technology being employed, Groupe CB's topographers would typically only conduct a full survey of each site once or twice per year. “Our topographers were walking around on-site and taking their measurements manually, with GPS instruments. This was a long, dangerous and expensive process,” Amossé says. “Now these staff no longer need to go on site as Redbird can monitor its nine quarries—safely, from remote take-off and landing locations—simultaneously, on the same day every month. It's a progressive approach. We say that together we are building the future of quarry monitoring.”

Flying monthly

To survey each of these quarries, located across France, Redbird employs professional, independent senseFly eBee drone operators—members of its growing international network.

“These contractors fly each quarry on the same day each month, using the same flight plan within the drone's eMotion ground station software,” explains Emmanuel de Maistre, the CEO and co-founder of Redbird. “These operators then upload the drone's images to the Redbird cloud solution [previously called Cardinal], where they are processed into full 3D point clouds, digital surface models, slope maps and orthomosaics of each site.”

Accessible data, used widely

As per Redbird's contract with Groupe CB, the data from each monthly drone survey must be fully accessible online a mere 24 hours later.

“ Before working with Redbird we needed about five days to recover stockpile data. Today, once the drone has flown over a quarry, I'll get the data the next morning ”

“This approach provides fast data recovery and therefore incredible time savings,” Amossé says. “Before working with Redbird we needed about five days to recover stockpile data. Today, once the drone has flown over a quarry, I'll get the data the next morning. A site manager can then log in to the Redbird solution to access all the data they need, such as stockpile volumes and material types. Then we check these against production and sales to understand exactly what product has gone out, as well as to determine an exact stock value.”



Redbird's independent drone operators fly simple to use, hand-launched senseFly eBee UAVs.



An example eBee flight plan of a Groupe CB site, shown in 3D via Google Earth.



An overall view of Redbird's cloud solution, showing Groupe CB's Limont-Fontaine quarry.

The data supplied via Redbird's cloud is employed by a wide range of Groupe CB staff, who log-in directly online, taking distance, volume and area measurements, including elevation profiles (exportable as shapefiles or dwg files), adding annotations, attaching supplementary documents and comparing maps.

These staff include:

- Groupe CB's CFO and accountability team
- Blasting operations staff who need to track the progress of blasting operations (for example by calculating extraction volumes and monitoring quarry faces)
- Environmental officers who need to ensure environmental standards for local authorities
- Safety managers whose job it is to ensure compliance

Each quarry's monthly drone flight typically lasts around 30 minutes. Flights are flown at a height of approximately 100 or so metres, to achieve typical ground resolutions of between 3.5 and 4 cm per pixel.

“It is important to get the highest resolution with the drone possible to ensure the most accurate data and site survey we can,” de Maistre points out.

Weather wise, he adds, the ideal wind conditions for flying are between 0 and 6 metres per second. “A sunny day is best, without any clouds or grey skies, in order to get the very best quality images.”

Project workflow

- 01 Fly site (example: 1 quarry, 3 flights, 870 images)
- 02 Transfer images to Redbird's cloud solution
- 03 Images automatically processed (avg. 5 hour processing time per site)
- 04 Data delivery: within 24 hours

Key challenges

According to de Maistre, Redbird's big challenge is delivering Groupe CB's data to the cloud just 24 hours after the flight. "From the moment the images are captured and transferred to the cloud, we need to turn them into actionable data within a day," he says.

"Another challenge facing our team has been getting exactly the right high-quality pictures, using the correct camera settings, in order to be able to quickly and easily process these images," de Maistre adds.

“ Our final planimetric and altimetric precision is less than three centimetres, which is survey-grade accuracy ”

Redbird also sets ground control points (GCPs) alongside its eBee data acquisitions in order to maximise the precision of its drone outputs. "We have placed 77 GCPs across the client's nine sites—25 of which are used as check points—all measured with a Trimble GPS RTK device. These are then identified in the drone dataset once the photos have been processed. Through this approach our final planimetric and altimetric precision is less than three centimetres," de Maistre says, "which is survey-grade accuracy."

Real, positive results

Traditional surveying methods required a lot of manpower to collect the data required, work that was both dangerous and expensive. In addition, processing this data was highly time-consuming.

"In contrast, today with UAVs," says Amossé, "you need less manpower because you get data from the sky. And it is available as actionable data directly in the Redbird solution 24 hours later—and not only for one site but for all nine sites! We get a lot more points per square metre with the drones and therefore achieve a far greater reliability, both of the quarry surveys and stockpile volumes. The data Redbird supplies is completely trustworthy."

“ Our projects carried out using UAVs are five times cheaper than those done using traditional survey methods ”

From a cost perspective, Amossé says the drone difference is equally remarkable. "Our projects carried out using UAVs are five times cheaper than those done using traditional survey methods. It's as easy as child's play for us and it is radically changing our way of working."

"Now we know how to get the best from our quarry faces, and whether or not to modify the layout of our haul roads to improve road safety, and all of this information is available easily and instantly in the cloud," Amossé adds. "Drone data processing is a technology that, I'm sure, quarries all over the world will come to adopt, because it is so simple, reliable and

safe. A drone flying over the quarry face allows our blasting operators to precisely define where to drill without going close to the edge. They can stay at a safe distance and the result is a lot more accurate than laser scanning."

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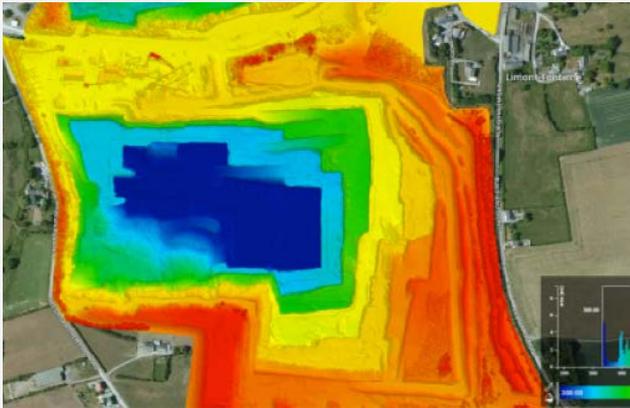
"Group CB's story is a great example of the value that Redbird and drone technology brings. With our dedicated collaborative cloud solution and network of professional eBee operators, we're helping contractors and mining companies across the EMEA region and the USA to improve their day-to-day operations with drone imagery," adds de Maistre.



An orthophoto of a Groupe CB quarry, showing the distribution of Redbird-installed GCPs.



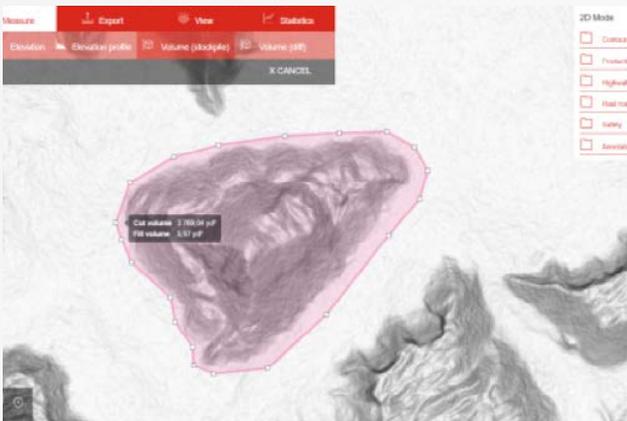
Redbird's drone-sourced orthomosaic of the Limont-Fontaine quarry.



Redbird's digital surface model (DSM) of the same site.

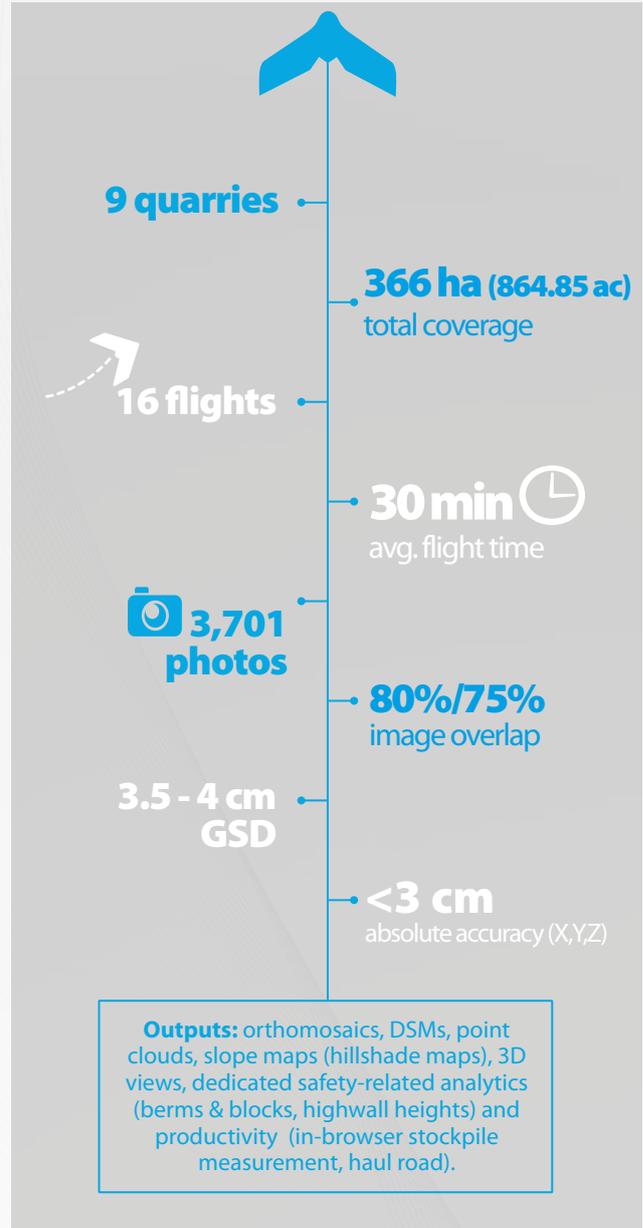


A slope map of the same quarry, produced within Redbird's cloud solution.



Measuring stockpile volumes based on drone-sourced data within Redbird's cloud solution.

MONTHLY STATISTICS



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Editor's note:

Since the publication of this article, Redbird was [acquired by Airware](#), providing a complete solution for construction sites, mines and quarries. Emmanuel de Maistre is today the Vice President of Airware's AEC Department.