DroneDeploy

Untapped Resources in Mining and Quarrying:

Drone Data and Analytics

In an increasingly complex and competitive business landscape, mining and quarrying companies must take great measures to ensure compliance, productivity, and safety. Not surprisingly, DroneDeploy found that the use of commercial drones in the industry grew a staggering 198% year over year in 2018.

Surface mines account for the majority of metals mining and aggregate production—and these are areas where drones offer enormous opportunity for businesses by improving efficiency, safety, and accuracy.

In this eBook, we'll explore the range of ways that drones can help mining companies mitigate risk, enhance safety, and maximize profits—from the exploratory phase all the way through the reclamation process.

We'll take a look at:

- **The Challenges Facing Mining and Quarrying Today**
- **Exploration:** Faster, More Productive, and More Secure Surveying
- **Site Design:** Planning Safe, Efficient, and Productive Mines and Quarries
- **Development, Production, Reclamation:** Improving Safety, Staying Compliant, Minimizing Costs

Readers will come away with an understanding of how to utilize drone data to drive value throughout every stage of the mining process.

DroneDeploy can help companies in mining and quarrying work safer, smarter, and more productively.

Exploration: Drones and drone solutions supplement surveying teams on the ground, empowering them to expeditiously find formations with the most potential in remote, unfamiliar territories.

Site Design: Drone data ensures that mining and quarrying companies are planning the safest, most efficient, and productive work sites.

Development through Reclamation: From building the mine to post-decommissioning, drone solutions ensure companies stay compliant, mitigate risks, and maximize profits.

The Challenges Facing Mining and Quarrying Today

Companies in mining and quarrying face many challenges today, and several of these issues are intertwined. Due to depleted resources, they must pursue increasingly scarce materials. As mining companies forge into new territories, they lose the infrastructure, technology, and energy needed to power their sites, which, in turn, drives up costs.

Then there are the risks as old as the industry itself: mining is inherently dangerous as companies move large amounts of earth—sometimes underground—via heavy machinery. Fumes from work sites can be toxic for both workers and the environment. Blasting related accidents—when stones hit workers or explosives detonate prematurely—can also pose catastrophic risks.

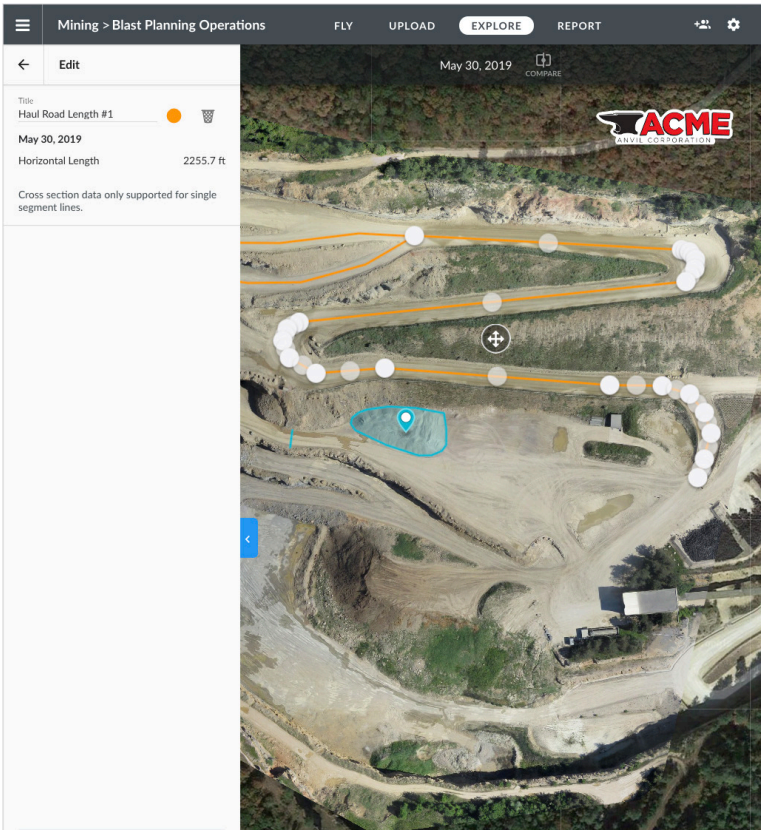
The software that is currently used to measure inventory and ensure there are enough materials to meet orders is often outdated and/or inaccurate. Once the material is mined, companies are still at the mercy of the ever-changing global commodities market.

The good news is that many of the solutions to these problems are also connected and can be solved through modern technology. If mining companies can be more efficient, choose and develop more productive sites, provide safer work sites for employees, and increase profit margins, they can thrive in the 21st-century economy. Drones can play a key role in facilitating many of these solutions.

Exploration: Faster, More Productive, and More Secure Surveying

As more resources get mined, companies are forced to push farther into remote territories in order to find productive sites. Generally speaking, small teams of surveyors, geologists, technicians, and hydrogeologists explore wide swaths of rural areas seeking the best formations to develop. Surveyors, loaded down with extensive imaging equipment, travel on foot to remote locations to thoroughly examine the potential of different deposits, then relay that information back to headquarters.

But this manual inspection has its challenges. Before surveyors get on the ground, they base their routes and inspections on a few low-resolution images. Consequently, entire days can be wasted examining potential sites that turn out to be unpromising. In addition, some competing companies monitor surveyors to keep tabs on possible mining sites—as these expedition crews can alert competitors to opportunities. With little connectivity, though, it's hard to upload images or get feedback from others who are not on the ground.



Mining companies leverage drones—which can fly in remote areas and produce high-quality images—to optimize their surveying teams on the ground.

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Airplanes, helicopters, and satellites provide additional avenues to gain intelligence on potential sites, but these options can be expensive and time-consuming, while cloud cover and inclement weather can limit their effectiveness. That’s where drones come in.

Drones can be incredibly instrumental during the exploratory phase. Mining companies can leverage drones—which can fly in remote areas and produce high-quality images—to optimize their surveying teams on the ground. Drone data provides comprehensive, detailed surveys of vast areas and, at the same time, reduce detours to check out unproductive formations. Through features like Live Map, DroneDeploy empowers users to create maps in real-time without needing an internet connection. When choosing between two sites, DroneDeploy can help visualize site conditions, estimate production, or measure blast efficiency.

With the help of drones, surveyors get more information and prioritize their inspections of the formations that have the most potential, saving a huge amount of time. Mining companies leveraging drones in the exploratory stage can cover larger areas of land and produce higher quality images, allowing them to make better decisions while working smarter and faster in the field.

Generate a Live Map in real-time.

Site Design: Planning Safe, Efficient, and Productive Mines and Quarries

Once an area has been chosen, the next three stages for mining companies are site design, development, and production. Each phase produces its own unique challenges.

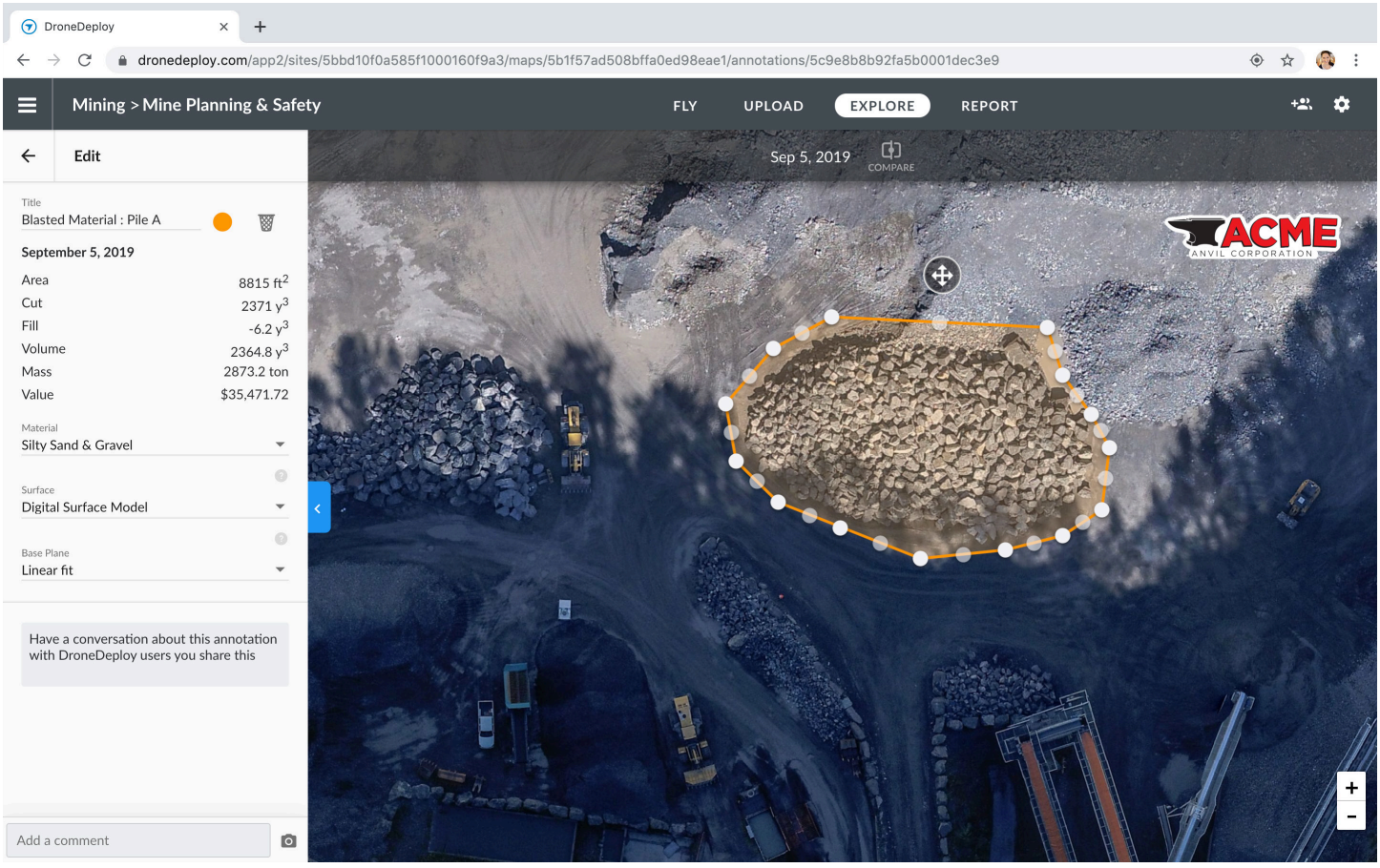
Site design faces many of the same challenges as the exploratory phase. Mining and quarrying companies need to create cost-effective work sites, but the images available are often low resolution, outdated, or both. One of the major hindrances to site design, though, is that the existing software solutions used in this phase are severely antiquated. For example, it takes upwards of twenty hours to survey and process data for a 1,400 acre quarry; an aerial survey of the same time took just two hours.

High-resolution drone surveys help mining companies understand the lay of the land before breaking ground.

Having accurate information in the design is vital, as mines involve substantial safety and environmental risks. Highly regulated, site designs must comply with both local and federal safety and environmental protocols. Accidents can be expensive due to workers' compensation claims or spills of hazardous materials that can run up millions of dollars in fines and clean-up costs. Drone data and maps create a paper trail that documents environmental and regulatory compliance — mitigating risk to the company.

Mining companies are tasked with creating extensive 2D and 3D models. Engineering, drilling, and blasting consultants develop the most efficient and secure way to develop the mine. The goal here is to be efficient: minimizing the cost of explosives and the movement of heavy excavation equipment. Bench heights, haulage road slopes, and drainage plans all need to be compliant with environmental regulations.

High-resolution drone surveys help mining companies understand the lay of the land before breaking ground. And as a project progresses, these surveys are essential for helping mining companies constantly reevaluate how they're blasting in order to stay efficient, safe, and compliant. These surveys help identify potential hazards, reduce the amount of earthmoving, and create a mine plan that optimizes safety and efficiency. They also create a paper trail that documents environmental and regulatory compliance, minimizing risk to the company. The end result is unparalleled ROI: mining companies create a 360-degree view of their site and also their operations.



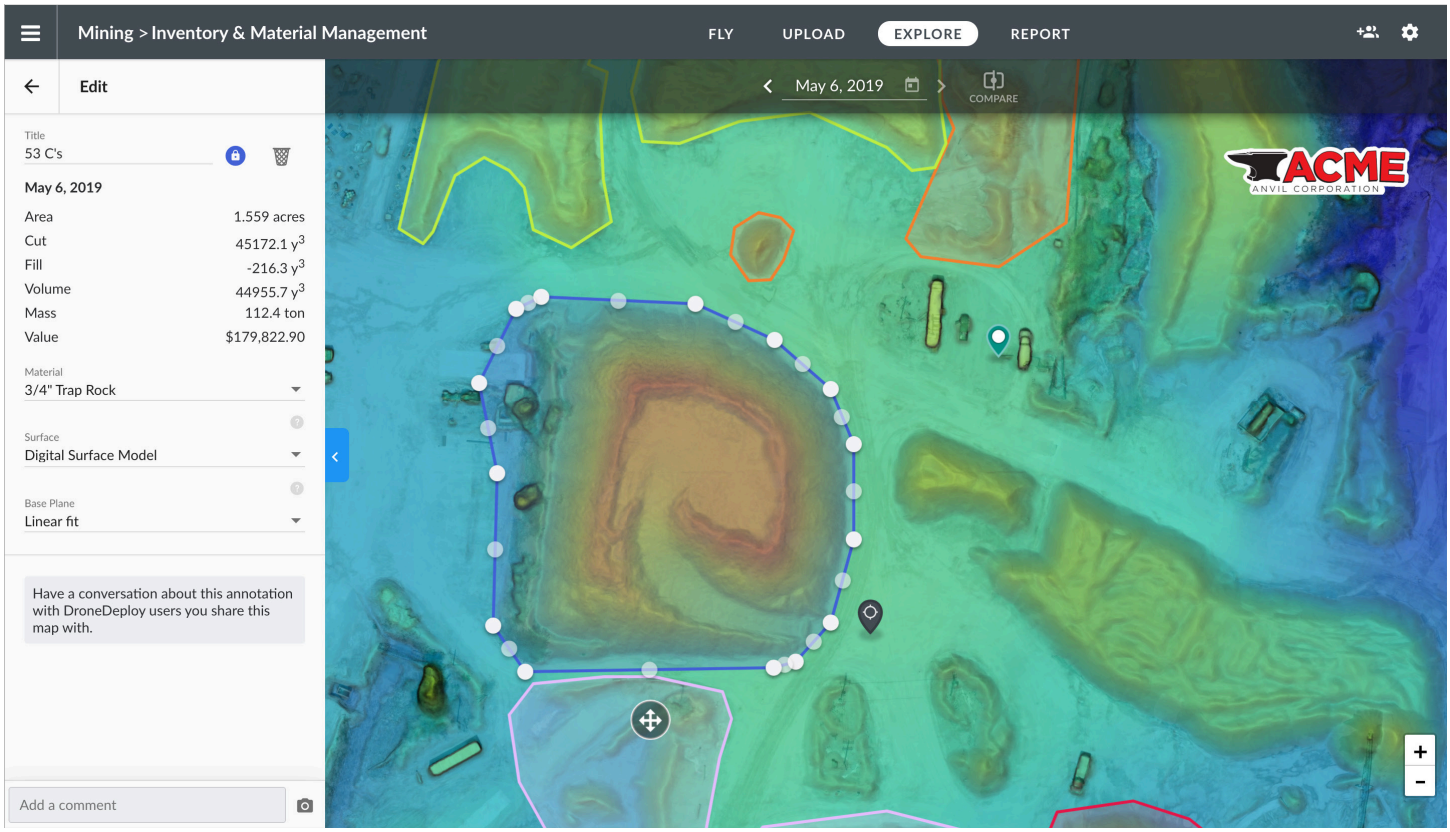
High-resolution drone surveys are essential for helping mining companies constantly reevaluate how they're blasting in order to stay efficient, safe, and compliant.

Development, Production, Reclamation: Improving Safety, Staying Compliant, Minimizing Costs

Once a plan has been created, it's time to develop the mine and start producing materials.

Workers who develop or construct a mine will leverage drone images and maps to maintain safe working conditions and coordinate logistics in remote, unfamiliar areas. Drones conduct equipment inspections, minimizing risk and downtime. The captured images can measure routes to plan more efficient hauling logistics. On-site, these images educate staff on how to efficiently use equipment while, off-site, these images can show and relay progress to executives, maintaining production and compliance.

Some of the most fruitful opportunities for drones in the mining industry are in the production stage. Mining companies are always trying to ensure that they have enough material to fulfill orders, but these massive amounts of aggregates can be difficult to measure. Conventional



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measuring methods include ground-based surveys or LIDAR plane flights and measurement devices that track conveyor throughput. However, these methods can be very expensive. Drones improve inventory management by conducting more flights and leveraging a range of different images for better, more accurate volumetric reporting. DroneDeploy empowers customers to measure inventory more often for a fraction of the cost of traditional methods—all available in an easy-to-use, audit-friendly hub for all stockpile volume measurements.

Once a mine has reached the end of its life cycle, mining companies are required to return the site as close to its original condition as possible. For surface mining, this involves filling the pit from which minerals were extracted, identifying and mitigating any potential contaminants, and revegetating the surface. Drone images can even help illustrate the health of vegetation on a decommissioned mine.

But an original site that was not well documented or photographed can cause compliance risks and raise the chance of an inspection or an audit. Regular drone flights throughout the course of a project—from the exploratory phase all the way through reclamation—help mining companies remain in compliance and reduce the risk of breaking environmental requirements.

Your Call to Action

Drones can provide a transformative advantage for mining companies at every stage of the mining process by ensuring safety, efficiency, and accuracy.

To learn more about DroneDeploy and how it can improve your mining operations, visit our mining webpage or talk with an expert.


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