



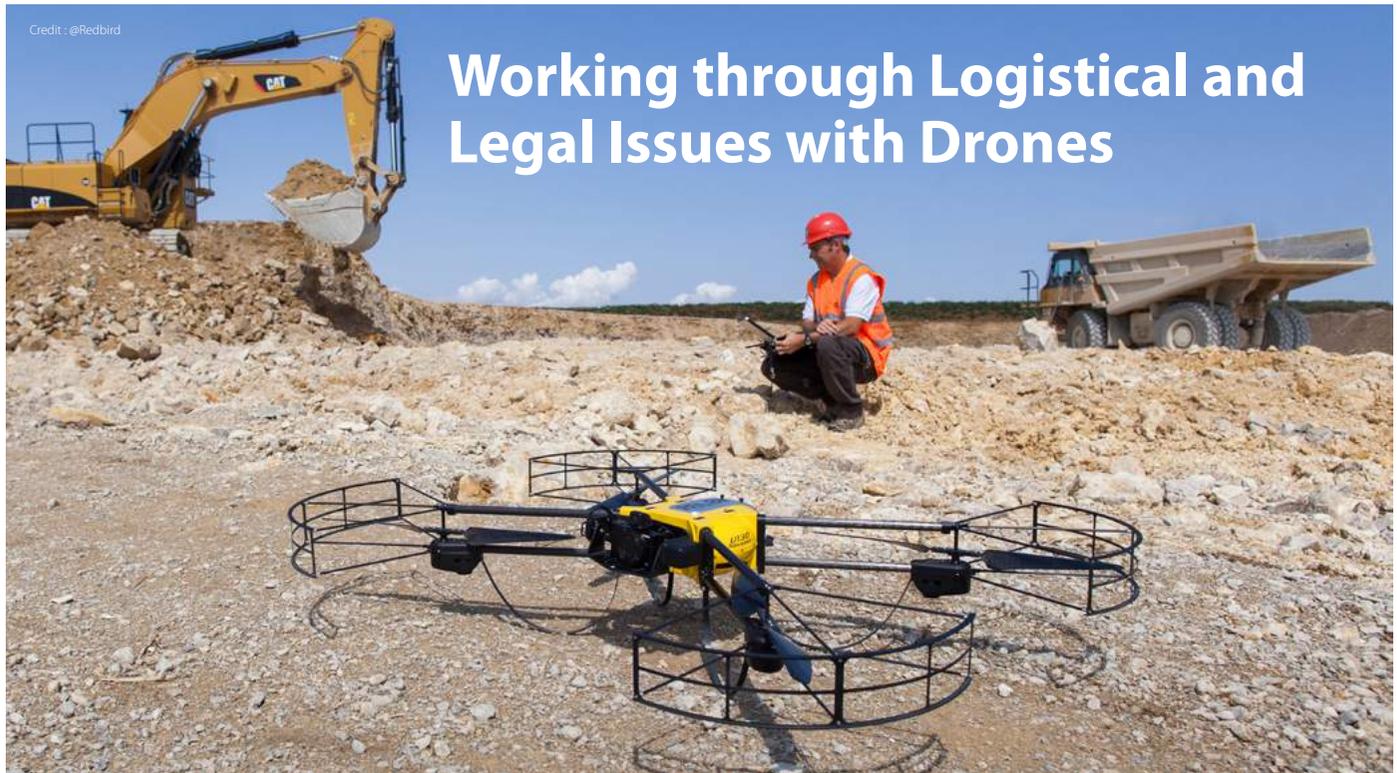
# UAVs for Mining and Aggregate Operations

By Jeremiah Karpowicz

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## Working through Logistical and Legal Issues with Drones

By Jeremiah Karpowicz

**DRONES HAVE AUGMENTED** the abilities of professionals in various industries, but nowhere have those impacts been seen or felt like they have in mining. Engineers and operators in this space are using drones in conjunction with existing techniques and tools to create more powerful workflows that have made these operations safer and more efficient, and those changes are apparent everywhere you look.

Mining professionals have been able to utilize drones to examine and adjust their entire approach. Drone surveys are by and large replacing traditional ground surveys, or expensive methods like LIDAR surveys. Surveying equipment that was used for volume calculations are now used to tie in the data collected from the drone. Companies can use UAVs to perform visual inspections and answer questions on volumetrics and topography in order to help keep tabs on stockpiles. These efforts allow operators to produce a scaled dataset that can be trusted when making calculations.

The bottom line is that UAVs have given operators access that was previously unheard of, along with the ability to collect more valuable data, all while reducing the time spent gathering that info. That time and effort around gathering such info is something Iain Allen knows all too well. As Senior Manager, Mining Information Technology at Barrick Gold, his position involves monitoring new and innovative technologies relevant to spatial data collection, management and analysis. In this role he's seen and experienced how drones are changing operations.

"The biggest change that UAVs have enabled is around stockpile volumes," Allen said. "With conventional surveying, it's inherently unsafe to have people on the stockpiles, so we would do the best we could, and it was very time-consuming. With UAVs, we get better data, faster and more safely. We can get 3D models as often as we want."

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Those additional abilities are important, but there are logistical and legal challenges associated with being able to realize such benefits. How will or won't the people working a site treat UAVs if the push to see them utilized comes from the corporate level? Additionally, FAA

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regulations in the United States have caused many organizations to pull back from their plans around drones, even as companies in places like France and Canada see the benefits in terms of their bottom line, and how they impact safety issues throughout a site. How such logistical and legal issues are resolved and worked through will ultimately determine the sort of impact UAVs can have throughout the mining industry.

## UAVs Lead to Measurable Increases in Efficiency

TRADITIONAL SURVEYING METHODS take days, sometimes even weeks, to complete. What had always been a long and laborious process is changing to fast, easy, accurate and safe data collection, and that’s all because of the advantages that drones enable. Emmanuel de Maistre has seen how UAVs have helped change the paradigm around data collection as the CEO of Redbird, an analytics company processing drone-acquired data, at scale.

“With drones, the approach is totally different,” de Maistre mentioned. “Data is captured by a robot and can then be processed and extracted automatically with a cloud platform. As a result, the drone-acquired information can be made available to virtually anyone on the site. This kind of process creates the possibility for customers to better monitor their sites, improve their productivity, and save costs.”

The amount of information that operators can gather quickly and easily has completely changed assumptions and expectations that professionals have been working with for decades. That change directly impacts how costs are realized on a project, which is of critical importance. For most mining companies, the main operating cost is fuel on account of the energy it takes to move such heavy equipment from one place to another, even when that space is relatively small. When the data captured from a drone is appropriately processed and analyzed, an organization can alter their on-site movements to ensure they’re getting the lowest fuel consumption possible.

This increase in efficiency is impacted greatly by what makes sense for a particular company and the regulations under which they’re working though. Whether an organization elects to outsource UAV operations, or do it all in-house, is almost as important as what country they’re flying in. Sorting through such questions is something Peter LeCouffe does on a regular basis. As the Operations Manager at Harrier Aerial Surveys, a fully licensed commercial UAV remote sensing service provider, LeCouffe is very aware of the challenges that many organizations



Credit : @Redbird

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struggle with when it comes to efficiency and regulation.

“When an organization is starting a UAV program themselves, we have seen challenges in the effort required to conform to regulations as well as technical difficulties with the learning curve associated with the new technology,” said LeCouffe. “Employees are used to using more rugged instruments and generally drones are much more fragile. This can end up costing the company a lot of money when starting out. When hiring a service provider, the companies are hiring experts that can handle these challenges. The only issue left to the service provider after addressing the regulations and training is to convince the client of the benefits to their operation.”

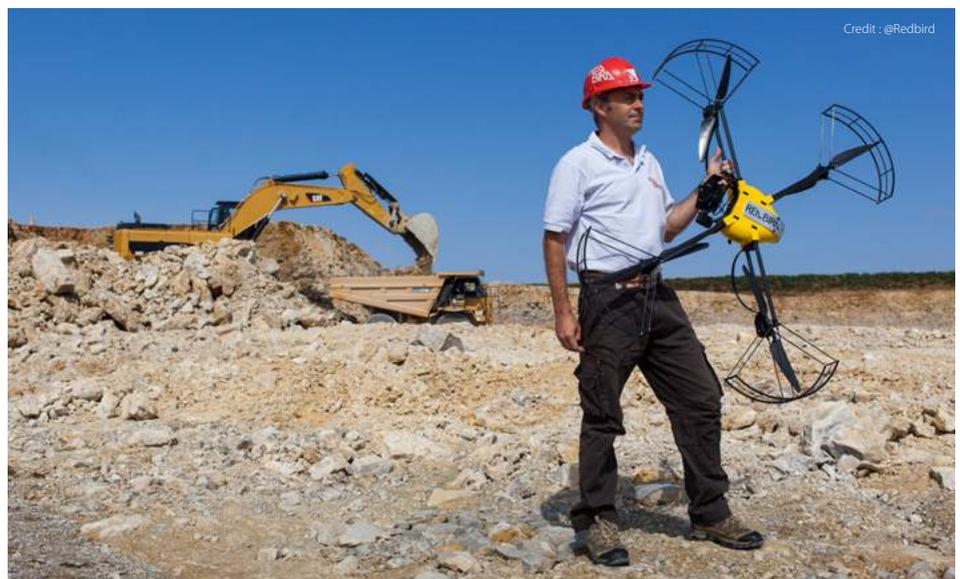
The benefits in terms of efficiency are there for any mining operation to take advantage of, no matter their size, location or implementation strategy.

### Making Everyone and Everything Safer

THE DIFFERENCES IN TERMS of regulation mean that operating a drone can look very different in one country versus another. For instance, in the United States, operators are not allowed to fly beyond visual line-of-sight and they need to file for and receive a 333 Exemption which then requires a licensed pilot to operate the drone. Neither of these requirements exists for operators in France.

Such restrictions have invariably caused organizations to be leery of moving forward with a program that relies on or even utilizes drones, but doing so isn't just about helping the bottom line. Drones can and are having a major impact on safety concerns and issues that have often caused serious problems on sites.

“In many cases, drones are getting to places previously not humanly possible,” said LeCouffe. “Additionally, when creating higher efficiency in existing operations through the use of drones, dangerous situations are avoided. For example, one stockpile we monitor for volume calculations takes 8 hours to do manually. This exposes surveyors to unstable terrain and sharing the operating area with heavy machinery. With a drone, the flight takes 15 minutes. Not only are the surveyors removed from the dangerous areas but the whole operation is completed in a fraction of the time.”



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Regulations are around to keep everyone safe, and the task of doing so is by no means a small or trivial one. What makes the topic even more difficult is that distinctions around what it means to be “safe” can have different legal and practical definitions, which change from one country to another. Nonetheless, the push to define these terms isn’t one that is solely going to be determined by government agencies, and the opportunity to utilize tools that can make mining operations inherently safer isn’t one that can be ignored or minimized.

“There are countless potential applications, but one possible use we have for a drone that’s designed to fly underground centers on sending a product like that to places where we can’t send people, primarily for visual inspections,” Allen mentioned. “It could also be very useful in underground mine rescues, giving you a look at what has happened without needing to send people in to unsafe areas.”

Legal hurdles aren’t the only things that impact how drones can and are being utilized, but it’s important to remember that legitimate concerns about safety can also curb developments which would otherwise positively impact mining operations. Drones can and have made mining operations that much safer for everyone on a site.

### More Data and New Sensors Create Unique Opportunities

AUGMENTING THE WAY in which mining companies currently operate has obviously been an incredible development, but UAVs are about more than influencing and changing how these companies are working today. Sensor developments have created new opportunities and increased expectations around what sort of info can be gathered and in turn how it can best be utilized. Once this info is analyzed and organized, mining professionals are finding that they’re able to get an entirely new perspective around a site and their operation.

“Data captured by drones combined with dedicated analytics can easily measure and quantify information that was hard and time consuming to get before,” said de Maistre. “With all these new datasets, people are really changing the way they monitor their site operations. The cloud allows a new collaborative and more efficient approach to the monitoring of the sites. Even if people are not experts with data and data processing, they can interact with one another and effectively collaborate thanks to a user-friendly cloud interface.”





**About the Author:**

*Jeremiah Karpowicz is the Executive Editor for Commercial UAV News. He has created articles, videos, newsletters, ebooks and plenty more for various communities as a contributor and editor. He has also worked as the Executive Editor for ProVideo Coalition where he was first introduced to UAV technology.*

More than anything else, drones have helped open up more info to more people on a job site, and that’s encouraged operators and executives to redefine how things are being done. If more people have access to more info, solutions that few have considered or thought through are going to be created and then enacted. Sensor developments are providing totally new and relevant info, and it’s info that can help detect leaks in pipelines or discover toxic gas leaks. But examples like these are just a hint of the capabilities that could soon be available.

“For me, the most exciting thing about all of this is the new sensors,” Allen concluded. “Those are the infrared sensors, the thermal sensors and the hyper spectral sensors. They’re getting lighter, they’re getting smaller and they’re getting less expensive. That’s going to open up a whole new series of possibilities for us. When out of the box thinking like this is displayed and encouraged, then it’s just about seeing what we can do.”

Once the various legal and logistical roadblocks are removed, mining and aggregate operations will be able to fully incorporate UAVs to see tremendous economic and safety benefits, but that will just be the beginning. After drones have been more fully integrated in mining operations we’ll begin to see true innovation in terms of how these tools are being utilized and what they’ll be able to create and enable. That includes things like the establishment of mines in remote locations, instant delivery of spare parts and plenty more. Users always find the best and most relevant ways to utilize their tools, and once mining engineers and managers can do so with drones, we’ll see improvements that take the industry to another level. ■

**Experts Interviewed for this Report**



**IAIN ALLEN**  
Senior Manager,  
Mining Information  
Technology  
Barrick Gold

Iain has more than 25 years’ experience in the mining industry, ranging from mapping and drilling in remote areas of Canada to his current position monitoring new and innovative technologies relevant to spatial data collection, management and analysis for Barrick Gold, with a particular interest in the growing use of UAVs. In addition to a 5 year stint as an independent consultant, he has worked as an employee for companies of all sizes, working in 15 different countries on 5 continents. While the bulk of his experience is in gold exploration and mining, he also has experience in base metal and diamond exploration.



**EMMANUEL DE MAISTRE**  
Co-Founder and CEO  
Redbird

Emmanuel de Maistre founded the French Commercial Drone Association, where he was Chairman for 18 months and is now a member of the Board. Today, Emmanuel is the CEO of Redbird. He cofounded the company in 2012, with two friends: Emmanuel Noirhomme, the COO, and Benjamin Hugonet, the Vice President of Sales. Redbird is an analytics company processing drone-acquired data, at scale. As one of the fastest growing companies in the drone industry, Redbird deploys advanced aerial and data analytics technologies for three major markets: Mining and Construction, Transportation & Utilities, and Environment. Redbird has offices in Paris and San Francisco.



**PETER LECOUFFE**  
Operations Manager  
Harrier Aerial Surveys

Peter LeCouffe is the Operations Manager at Harrier Aerial Surveys, a fully licensed commercial unmanned aerial vehicle (UAV) remote sensing service provider. With their expertise in high precision surveying, GIS and remote sensing, Harrier Aerial Surveys offers accurate aerial imagery, digital elevation models and 3D measurements and calculations. Peter is currently developing the organization alongside his team and works as a UAV Pilot and image processing.

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