MEXICO

MINING REVIEW

2017

CANADIAN DATA ANALYZER PLANNING MEXICO OFFICE

CHRIS DRIELSMA
President & CEO of DGI Geoscience

Q: What are the largest projects the company is currently working on in Mexico?

A: DGI has been working in Mexico for more than a decade, and we are in the process of establishing a permanent office in the country. Mexico has a strong and educated workforce, and it continues to be an interesting jurisdiction for mining investment. As a value added service provider, Mexico is a very attractive location for DGI because there is great scope for growth throughout the country. In terms of projects, recently we have been working with Goldcorp on a number of different assignments, including at El Camino Rojo in Zacatecas. For a number of years, we assisted the company by providing information for their prefeasibility studies, including geotechnical and structural data from drill holes. We measured the true strike and dip of faults, joints, foliation, and contacts. This is particularly valuable when carrying out pit shell design work because it allows the operator to understand technical risks and hazards associated with the activity. Traditional means of acquiring that information would be through drilling and extracting data from the core. However, in the corebox, the areas of higher geotechnical interest often contain only rubble and it is extremely difficult to extract usable information from those areas. By acquiring in-situ, the information can be acquired from the entire length of hole.

Q: What are the defining features you have to consider when carrying out operations in underground mines?

A: Goldcorp is producing at Peñasquito, an open-pit mine. Although the existing pit shell is being used, the company is looking to expand, and if possible to increase the stripping ratios. The high pit shell walls drive down costs by moving less waste rock, with less environmental impact. In Peñasquito, we acquired geotechnical information inside the pit so Goldcorp could refine its pit shell model and therefore reduce costs. In an underground environment, we routinely assist on brownfield underground explorations by mapping structures and understanding geotechnical risks but also in instances of underground expansion. Recently we worked on an interesting project for one of our clients. The company is developing a new underground area, and prior to our involvement it was drilling a series of three holes to triangulate and understand the geotechnical risks prior to allowing workers to enter the mine. This took a great deal of time and drilling costs so we worked with our client to devise a new strategy where it would drill just one long, flat drill hole of about 600m in advance of the drift. We then gathered the needed information from the hole with televiewers. This had a number of benefits. Firstly, by drilling one hole instead of three, the drilling costs were reduced by two thirds. Secondly, we provided the geotechnical information much sooner, and thirdly, it provided the most complete information because now they would get that information throughout the entire hole and not just from areas with competent core.

Q: How do you expect the Mexican mining industry to develop over the next few years, and what will be the role of DGI Geoscience?

A: We are very excited about Mexico and its future. We have seen increasing investment in the country by our Canadian and US clients that brought us to Mexico to work on their projects. Recently, we have been in extensive discussions with Mexican companies to provide our services directly. We have been taking the proactive approach of co-hosting workshops in Chihuahua and Hermosillo. We want to build up the knowledge base within the eager Mexican mining community. By establishing a permanent office with Mexican staff we can serve the market locally because we do not want our Mexican clients to have to contact Canada or the US if they are looking for services in the region. Therefore, we are looking at options for Mexican partnerships because we feel that having local knowledge will be key to achieving growth. Of course we could grow organically but we feel that it would be a slower growth, and we believe that we can learn from the knowledge of Mexican companies, which would add more value to our clients.

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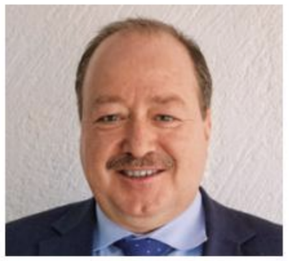

SHOULDERING MINE OPERATORS' FISCAL BURDEN

JESÚS HERRERA
Director General of Detector Exploraciones

Q: What objectives have you accomplished in the past two years and what are your next steps?

A: The year 2012 was our best-performance period, reaching the highest peak in production in the history of our company. We consolidated our Mexican operations by drilling over 250km. In 2013, we all encountered the fall in commodity prices, and from then on we focused on maintaining our personnel and lowering our operational costs so we would still have projects in the pipeline. We reached this by being more productive with our highly competitive prices. During times of abundance and high commodity prices, companies often do not pay attention to their costs and sometimes make investments that are not necessarily cost-effective. However, in a downturn we must have the vision to maintain and direct our team, our work, and our clients to a sustainable operational phase. If this does not happen and service companies like us are not consolidated they will disappear.

Q: Does the company conduct exploration on its own or just provide its services to third parties?

A: Detector Exploraciones does not have concessions as this would create a conflict of interest with our customers. The companies that employ us gain several advantages, including our expertise in land use and our preeminent drilling knowledge. Recently, we acquired a drone that photographs the land and its structures. This tells me we are on the right track, and if the federal government supports the Mexican Geological Service, companies could invest with more certainty. The other point is that the General Coordination of Mines must expedite its processes and make them more efficient so they could have concession resolutions on time. We have been on hold for the past three years because the Coordination cancels inactive or unexplored concessions but takes a great amount of time to publish them again. The problem is that there have been many cancellations due to concessions shrinking that have not been published again. This does not allow companies to make new investments in areas with more probable reserves.

Q: Why would mine operators acquire your services when most of them have their own geologists?

A: Even when companies have the infrastructure to explore, most of the time it is not sufficiently developed. With defined exploration programs operators calculate that it is more convenient for them to come to us. This is mainly because they would not have to carry a fiscal burden with the responsibility of security problems, permits, and even the investment in drilling equipment falling on our shoulders. In the last few years, all the mine operators used to have their exploration and drilling departments but now they know that this venture is not profitable for them. When I worked for Autlan, in a year we would drill 8,000m with eight machines, which is extremely inefficient. At Detector Exploraciones we can drill the same distance with one machine in six months.

Q: What are the objectives that Detector Exploraciones wants to accomplish in the next 12-18 months?

A: We made a cartography for the Mexican Geological Service (SGM) many years ago and Colombia is now in the process of replicating it. This not only helps foreign investment to flow in, supported on accurate information to locate possible deposits, but it also helps identify if a certain construction is safe or whether the rock could hold any structure. This is why we have also received calls from Paraguay and other countries to assist them with their cartography.

DRONE TECHNOLOGY TO MAP MINE SITES

Detector Exploraciones' drone project was designed to create georeferenced aerial photography of any linear or surface project. In order to conduct an aerial photographic survey, the processing and post processing of the information was divided into two activities, a field phase and an interpretation phase. The study area comprised two areas, one a powerline with a length of 40km, and the second with a length of 70km. The 110 control points were defined using sub-meter GPS accuracy, in order to make an adjustment in the post-processing for generating the photomosaic of the land. Each and every one of the points was marked with square shaped references with a dimension of $2m^2$, and in the center a 0.5in rod was placed. Checkpoints were erected prior to the flight day. During the preparation and calibration stage, air vehicle assembly, calibration, remote control, telemetry link, review, and breakeven load was performed. Based on the reference coordinates (AOI) and points previously recorded, control software defined the flight pattern in the flight plan to cover the area of interest. In this case, it defined a flight path from recorded coordinates. 10 photography sessions were held with an approximate duration of 45 minutes each. In total, more than 202 pictures were taken with a geographic reference (geotag).

Subsequently, during the interpretation stage, the processing and initial calibration of photos was carried out to determine flight altitude. Regarding the flying height and positioning data of each of the photos, the initial processing and calculation with an optimal resolution of 7.96cm/pixel was generated. The data processing was performed using the WGS 84 UTM zone 13 coordinates system. From geolocation data, relative terrain heights were calculated, with the goal of using the point cloud to generate the mooring or tie between images. Once the point cloud generated the mooring, both the filtered point cloud and the densified format were created. Based on the structure of the point cloud, the digital surface model (DSM), which corresponds to a continuous numerical model representing the terrain heights and surface objects like buildings and vegetation, is generated. From the set of pictures calibrated, the process of image orthorectification with the help of ground control points was performed. Pairing or matching of images was established from the control points and the number of pictures present on the scenes. Finally, an investigation of the area was carried out in the National Agrarian Registry and the Land Registry in order to obtain all the legal background and to define the land surface layer.