



Noise control

Soft dB's Pierre-Claude Ostiguy discusses how mining projects can help maintain noise and vibration compliance while keeping operations running smoothly

By Mehanaz Yakub

Pierre-Claude Ostiguy is the director of the acoustics and vibration monitoring division at Soft dB, the largest private engineering firm in Canada that specializes in acoustics and vibration. With a doctorate in vibration, his expertise encompasses turning complex technical insights around acoustics and vibrations into practical solutions. Over the past five years, he has led his team in the development of tools, products and services designed to address the increasing need for effective noise and vibration monitoring at mining projects.

CIM Magazine spoke with Ostiguy to learn more about the importance of noise and vibration monitoring, the challenges it presents and the solutions that mines can adopt to ensure that their noise and vibrations are under control.

CIM: Why is noise and vibration monitoring and management crucial for mining projects?

Ostiguy: There are two main reasons. The first involves regulatory compliance. In Canada, mining operations are mandated to comply with federal, provincial and local noise regulations and standards. With certain noise or vibratory guidelines set in place, the noise contribution of a mine must not be in exceedance of these specific levels during daytime or nighttime

hours. As such, if a blast were to occur, it is critical that emissions do not surpass certain vibration or overpressure values.

There are studies that can be conducted in the design phase to ensure that a mine will operate within regulatory compliance once production is under way, but it is important to understand that there are many variables that can have an effect on noise climate—whether it's wind direction or thermal inversion. If there is a constant noise source, the noise level heard at a distance may actually change from day to day, even though the sound generated by the source remains unchanged. Having monitoring stations strategically in place allows for the ability to verify that operations are maintaining regulatory compliance, while also being able to address any variations in noise levels, should it become necessary.

The second reason is that community engagement becomes increasingly more important over the course of the entire mining process, starting from the exploration phase to the completion, or decommissioning, of the mine. Utilizing noise and vibration monitoring is an effective strategy, particularly with regard to community relations and social acceptance.

With the addition of new activities to the existing environment, such as exploration drilling, open-pit mining or the use of ventilation fans for underground mines, these changes can

cause a dramatic effect on the acoustic climate of the area. Therefore, when neighbouring communities are impacted by such change, this can often result in social acceptance challenges, especially when noise and vibration is not properly taken into account.

While there are some methods that can be used to reduce noise at source, effective noise and vibration monitoring has the advantage of being able to quickly address any complaints being raised by neighbouring communities. Continuous audio recording gives you the ability to verify the precise noise levels at the time of the complaint, assess whether the levels were in compliance and identify the exact source of the noise causing the disturbance.

An important aspect of community engagement is also understanding that it's not necessarily the loudest noise over a certain period that generates complaints—it could be a specific sound. For example, a fan that is continuously running might blend into the background over time, but a back-up alarm on a truck at 2 a.m. is more likely to lead to complaints. Despite being louder and shorter in duration, if we were to look at the average noise level over an hour, the noise contribution of the back-up alarm is marginal.

By having an effective real-time monitoring solution with continuous audio recordings, you can literally go back in time, listen to the noise and then assist the mine in identifying the noise needing mitigation. Finding resolution efficiently and effectively is particularly helpful if the mine is aiming to improve community acceptance for its operations.

CIM: What are some challenges when it comes to managing noise and vibration at mine sites?

Ostiguy: The main challenge has been finding a way to isolate and provide only relevant information to the mine, while still being able to measure everything in the process. This becomes particularly important in cases where there has been a complaint or compliance assessment is needed, so that the mine has access to all the necessary information required.

Noise and/or vibration monitors run 24/7, which means that the volume of data being collected is quite high. The goal of any type of monitoring system is to have the ability to avoid false positives. An example of a false positive would be if a bird chirps next to the microphones and causes an exceedance of noise thresholds, thus causing an alert. Given that this noise is not associated with the mine's operations, finding a way to prevent the mine from being notified is a success that Soft dB has been able to achieve.

Soft dB has developed a patented artificial intelligence (AI) filtering tool, specifically designed for the mining sector, that has the ability to remove/filter any unrelated noises from the mining activities, such as cars, airplanes, trains, birds, frogs—anything unrelated to the mine. Therefore, only relevant noise specific to mining operations, and approaching the threshold of exceedance, will send a notification.

It's the same concept with vibration monitoring. To prevent sending false positives for vibration, we've also developed a patented system for seismic and blast monitoring called the Master Trigger, where all the vibration monitoring stations can communicate with each other. If there is an increase in vibration at one point, the server connected to the stations will ask all the other stations if the particular vibration was measured. If the answer is yes, a report is generated and sent to the mine, but if

the answer is no, the mine will not be notified, as it is deemed to be irrelevant.

CIM: What should be considered when implementing a noise and vibration monitoring system?

Ostiguy: There are a few aspects for mines to consider. It is important to have a solid background in noise and vibration, or to be supported by a company with strong expertise specifically in mining noise and vibration. Understanding mining operations, knowing precisely what is needed and what options are available, allows for the best outcomes when implementing and operating an effective monitoring system.

Monitoring solutions need to be capable of providing all the information necessary for a comprehensive understanding of the noise and vibration climate at all times. Monitoring isn't just about measuring a certain level, at a particular time—noise and vibration is far more complex. Having information on the amplitude and frequency of noise and continuous audio files is optimal.

Additionally, having a monitoring system that can reduce the overall time spent in the field, thereby increasing its efficiency. Monitoring solutions also need to be able to send data online in real time. If the system allows for this, then the mine can also receive notifications in real time, and is thus able to adjust accordingly.

There are also more advanced features, like automated calibration verification of microphones or vibration sensors, as well. These systems can perform daily self-checks, so that the mine won't need to send someone into the field every week to verify the sensors—it's all done automatically. Essentially, if something goes wrong, the client gets notified.

CIM: Do you have any successful case studies you can share with us?

Ostiguy: Soft dB is currently monitoring the noise and vibration at several mines across North America.

We have been providing monitoring services at Agnico Eagle's Canadian Malartic mine in Quebec for more than 10 years. It is one of the largest open-pit mines in Canada and its operations are located in close proximity to a community. Soft dB developed a system that informs the mine only when it is at risk of noise exceedance, while taking into consideration weather conditions, topography and the location of the trucks in real time. It calculates the mine's actual noise contribution in the community, which allows the company to be proactive at ensuring compliance. By utilizing the various tools that Soft dB has developed, the mine has been in total regulatory compliance for noise since 2018.

Soft dB was recognized for its excellence in environmental noise monitoring for the Canadian Malartic mine, in addition to being awarded a 2020 Québec Consulting Engineering Award (Grands Prix du génie-conseil québécois) acknowledging Soft dB for its mining activity monitoring program.

As part of its monitoring division, Soft dB actively participates in a variety of community initiatives. This includes meetings and presentations to provide its knowledge and expertise in noise and vibration, regarding the process of monitoring, how it works and how it can help [communities] to gain a better understanding of environmental noise, thus improving community acceptance.

Soft dB also provides noise and vibration monitoring services to Eldorado Gold Québec and its mining operations located in

Val-d'Or in northern Quebec. At the beginning of May, our specialists were invited to take part in a community meeting to offer an informational session about monitoring. This opportunity allowed our team to present our monitoring solutions, showcase our monitoring equipment being used for the mine, provide further explanation of what we are measuring (and how), as well as address any questions or concerns raised by the community members. Offering such opportunities to connect with communities, and provide transparency to noise and vibration solutions, has been shown to greatly increase social acceptance, thus contributing to the overall success of the mine.

CIM: What trends do you see in the future of noise and vibration monitoring for the mining sector?

Ostiguy: I believe that the future of noise and vibration monitoring in mining is having fully automated systems where there is no longer a need for someone to manage them or analyze the data and reports. The systems will provide all the relevant information effectively and independently on their own.

Getting to that point will require a lot of innovation, and this is precisely the direction where Soft dB is aiming to go—developing the next generation of noise and vibration monitors and web-based monitoring platforms. **CIM**



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