MINING NOISE CONTROL & MONITORING

Canadian Malartic Mining Noise Management Program

Soft dB

MINE CANADIAN MALARTIC

Managing Noise Across 24km²

Canadian Malartic Mine (CMM) is the largest open-pit gold mine in Canada. It produced 334,596 oz of gold in 2019. The mine's extraction activities span approximately 24 km2 (5930 acres) and many operations are carried less than 400 meters (1312 ft) from the nearest residential dwellings at the City of Malartic. Operating a mine in such an urban environment brings several issues and controlling noise emissions 24/7, rain or shine, is definitely one of the toughest challenges to tackle.

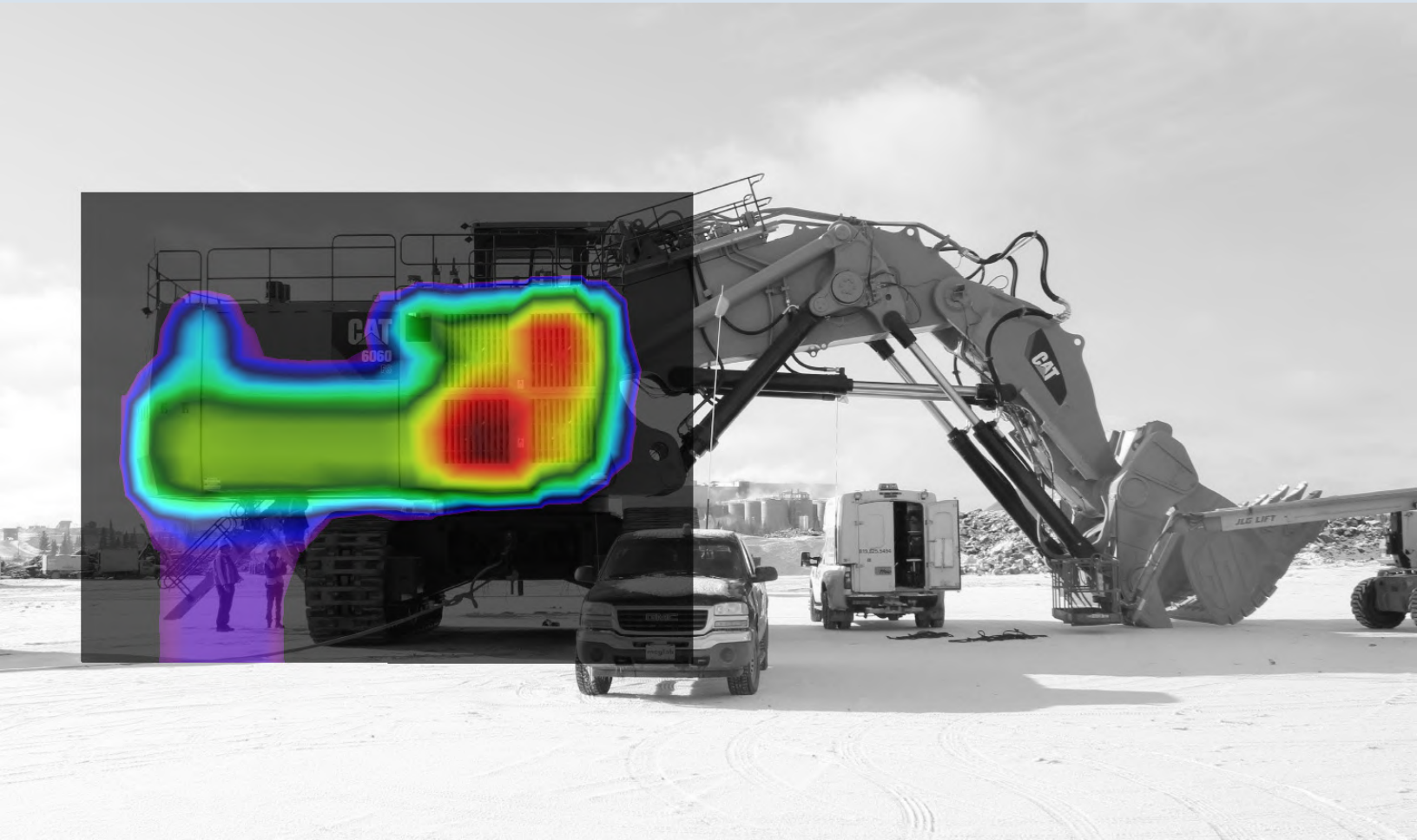
Innovations in Noise Control

Soft dB's support and partnership with CMM team includes several initiatives to manage and control the noise generated by the day to day mining operations.

Controlling Noise Emitted by Mining Vehicles

Soft dB team actively participated in the design, performance tests, and support for the implementation of innovative noise reduction measures on several heavy-duty vehicles and specialized mining equipments:

- Bodies of all production trucks have been covered with shock-absorbing rubber;
- Acoustic panel systems have been designed for LeTourneau loaders;
- Silencers for several mining vehicles have been tailor-made;
- Advanced visual diagnostics have been performed to each piece of equipment in order to optimize sound performances and minimize noise emissions.

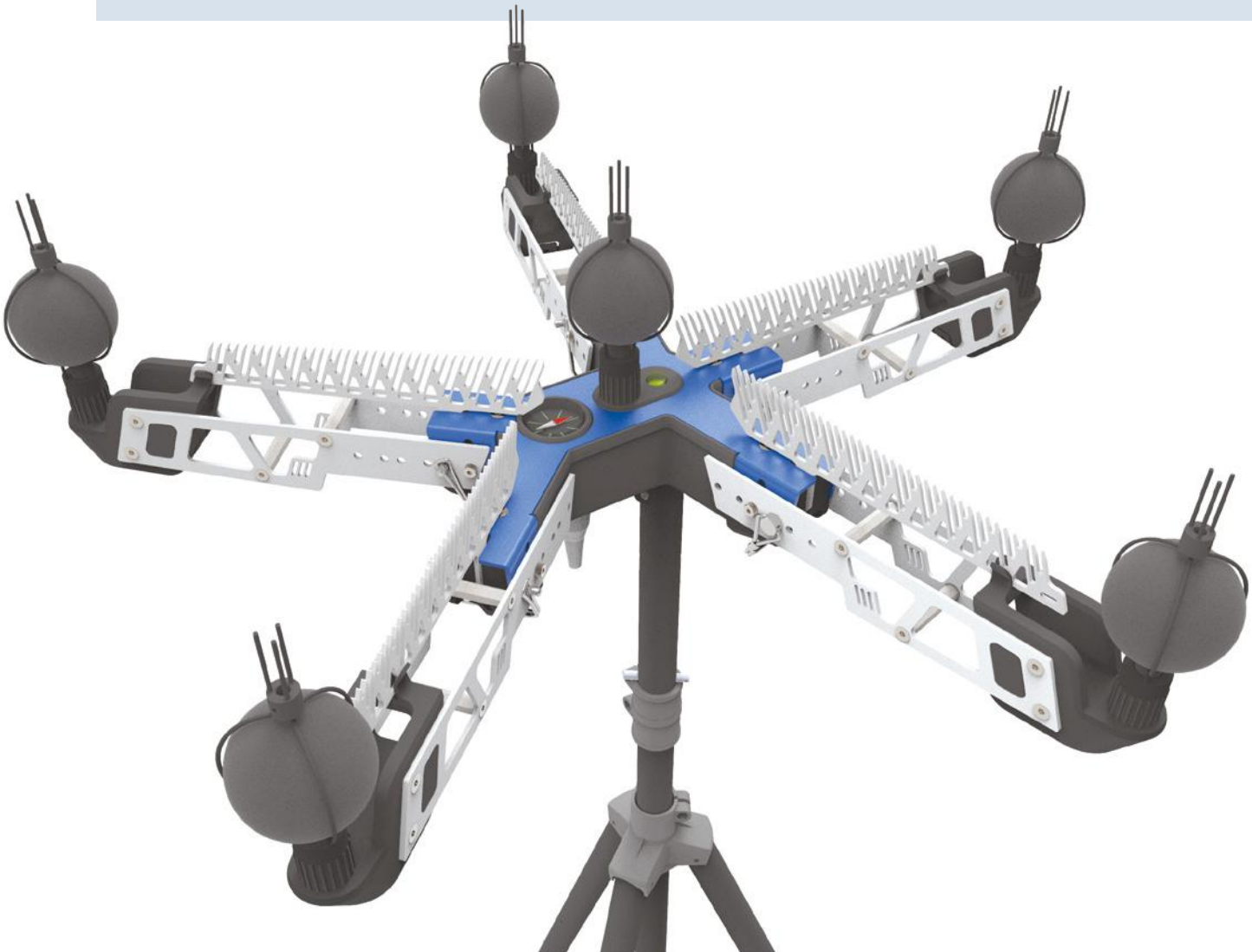


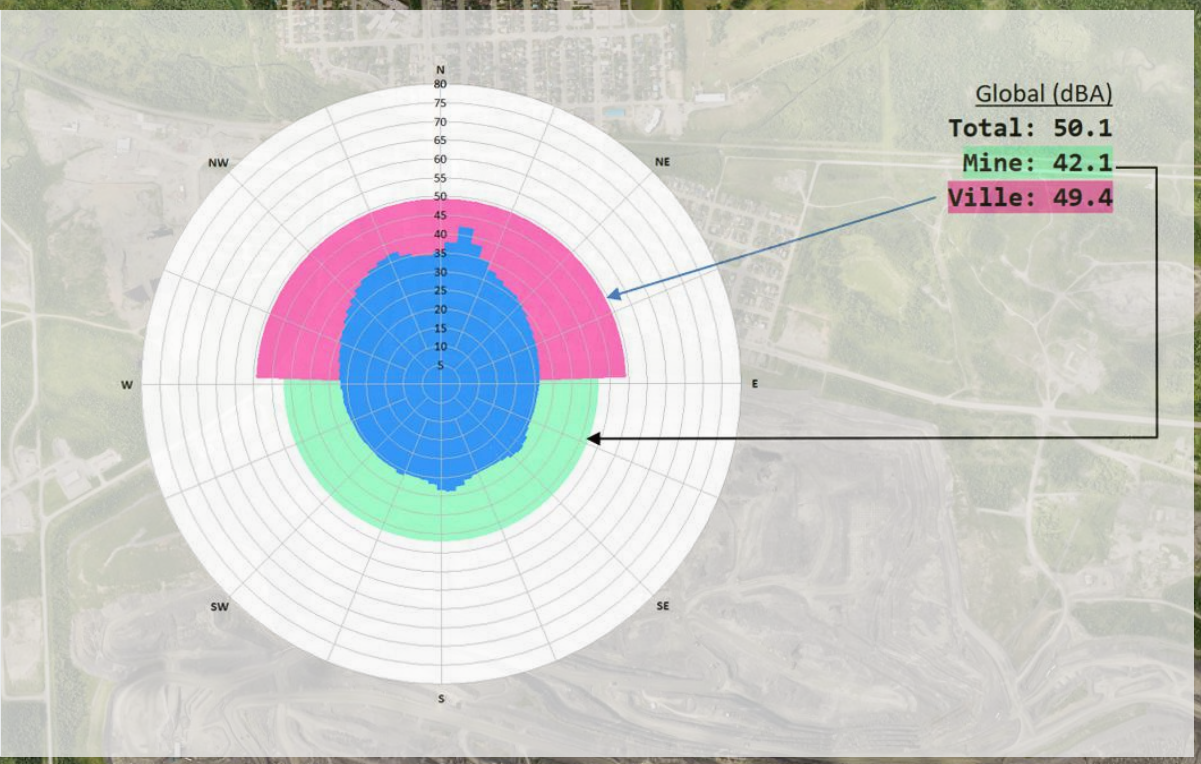
Innovations in Noise Control

Research and Development Activities Aimed at Improving Noise Monitoring Techniques

Since 2013, several research projects have been performed by Soft dB to develop innovative and perfectly integrated noise monitoring techniques that are specially tailored for the mining industry:

- Acoustic radars are utilized to identify in real-time whether the noise is generated at the mine or the surrounding environment;
- Patented calculation algorithm, correlating temporal variation in sound level between different stations and weather conditions is used;
- Artificial intelligence tools (under development) will allow real-time identification of sound events occurring at different stations.




N
NE
E
SE
S
SW
W
NW
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
Global (dBA)
Total: 50.1
Mine: 42.1
Ville: 49.4

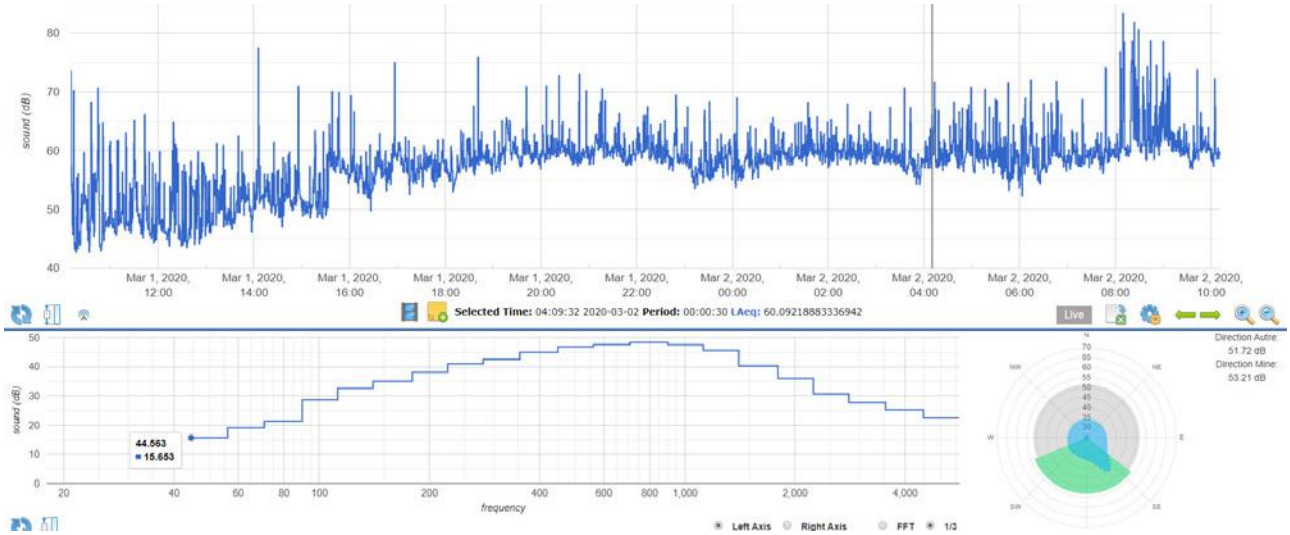
Innovations in Noise Control

Development of Specialized Tools and Software for Environmental Noise Monitoring

Soft dB has developed several in-house software and instruments to manage one of the largest noise monitoring networks in Canada. The CMM site is continuously monitored, 24/7 and 365 days a year, using the following equipment :

- 12 monitoring stations, of which two are used for regulatory compliance;
- 2 acoustic radars used to identify the source of the noise;
- A real-time visual dashboard showing the entire vehicle and equipment fleet;
- Automated community noise calculations.


Gestion sonore de l'équipement
Visualisation Profil Affichage
Équipements
Profil
Synch GPS
État détecté
État simulé
B1
B2
B3
Temps manuel
Météo manuelle
Calcul des delta avec tous les équipements
Soft dB
État détecté
(dB)
Mine
Delta
Absolu
Bruit résiduel (BR)
Mine + BR
Bruit évalué en ville (LEV)


sound (dB)
Mar 1, 2020, 12:00
Mar 1, 2020, 14:00
Mar 1, 2020, 16:00
Mar 1, 2020, 18:00
Mar 1, 2020, 20:00
Mar 1, 2020, 22:00
Mar 2, 2020, 00:00
Mar 2, 2020, 02:00
Mar 2, 2020, 04:00
Mar 2, 2020, 06:00
Mar 2, 2020, 08:00
Mar 2, 2020, 10:00
Selected Time: 04:09:32 2020-03-02 Period: 00:00:30 LAeq: 60.09218883336942
Live
44.563
15.653
frequency
Left Axis
Right Axis
FFT
1/3
Direction Autre: 51.72 dB
Direction Mine: 53.21 dB

Complexity and Challenges

At all times, the CMM mining site must comply with the noise levels prescribed by the Quebec Ministry of Sustainable Development, Environment, and the Fight Against Climate Change (MELCC). One of the requirements of the MELCC is to monitor noise compliance continuously, which is unique to the province of Quebec. The main challenge lies in the fact that the propagation of sound waves in the environment, given such a large industrial site, is influenced by numerous factors:

- The distances between noise sources and residential dwellings;
- The number of fixed and mobile equipment (over 100 units);
- The climatic conditions (wind, humidity or thermal inversion, i.e. cooler air at ground level and warmer air at higher altitude);
- The sheer size of the site being monitored (over 24 km2);
- The imposing size of mining vehicles and equipments;
- The continuous operation of equipments and 24/7 movement within the mine.

Acting Promptly on Excessive Noise Sources

All the software and tools implemented for the site's noise management are combined with Soft dB's continuous monitoring team. Our team instantly notifies the mine personnel whenever excessive noise occurs, allowing them to quickly act on operations that are potentially too noisy and reorganize them if needed. In extreme cases, such quick actions could go as far as a complete interruption of mining activities.

Making Decisions Based on Reliable Data

Also, the decisions leading to such actions must be based on strong expertise, supported by reliable and efficient environmental management tools. The goal of these tools is to prioritize the sound contributions of all equipment in real-time and enable key stakeholders to effectively target equipments that need to be halted in order to continuously maintain compliance with noise regulations.

▲ Noise measurements on a Pit Viper drill using a Concerto portable device

▲ Noise measurements on a drill in winter conditions

▲ Noise measurements on a moving truck

Socio-Economic Benefits

The Exploitation of Mineral Resources Done With Respect for the Community Brings Benefits to an Entire Society

Sound management of the noise levels within the Malartic community is essential in order to allow the mine to operate while respecting the residents of the city. An extensive consultation process involving the whole community, held from 2015 to 2017, has led to the development of a Cohabitation Guide, which includes numerous sound mitigation measures developed with the help of Soft dB.

As the main private employer of the regional county municipality of La Vallée-de-l'Or, with 1,800 employees working full time on its site, CMM has an economic responsibility that takes shape through several development levers that are reflected well beyond the mine itself; it is reflected across Quebec's society in its entirety. For instance, CMM paid $68M in mining taxes in 2018.

Environmental Benefits

Total Regulatory Compliance Since 2018

Performance reports and acoustic data are submitted to the Quebec Ministry of Sustainable Development, Environment, and the Fight Against Climate Change to demonstrate compliance of the mine with the regulations. In 2018 and 2019, CMM was 100% compliant with the noise limits applicable under the current standards. Furthermore, in 2018 there was a significant decrease of 71.4% in residents' complaints as compared to 2017.

Maintaining the Residents' Quality of Life

Noise issues are discussed periodically with the Canadian Malartic Exchange and Monitoring Committee to ensure that all information concerning environmental performance is shared, transparently, with the community. For the residents of the city of Malartic, the direct benefits of effective noise level management is to ensure a pleasant sound environment at all times and provide an environment comparable to all the other communities that do not live near a major mining operation.

Our Client's Success

CMM's expectations in terms of sound management have always been very high, which is essential considering the challenges and the scale of the mine. The main expectation of CMM from sound management is to be able to operate its site while ensuring that the ambient environment and the quality of life of residents are protected. In addition to the compliance with all of the MELCC requirements, the mining company also aims to continuously improve its practices to promote harmonious coexistence in Malartic.

The ideas and innovations brought by Soft dB to CMM have made it possible to build the pioneering and exemplary practices in the field of acoustics in Quebec and throughout North America. The sound management techniques utilised for Malartic have been the subject of conferences and international scientific publications.

Improvements in sound management performance in recent years have been significant and have helped foster the harmony between the mining industry and the people of Malartic. Soft dB has always worked to provide the most innovative ideas to meet challenges related to acoustics for CMM.

About Soft dB

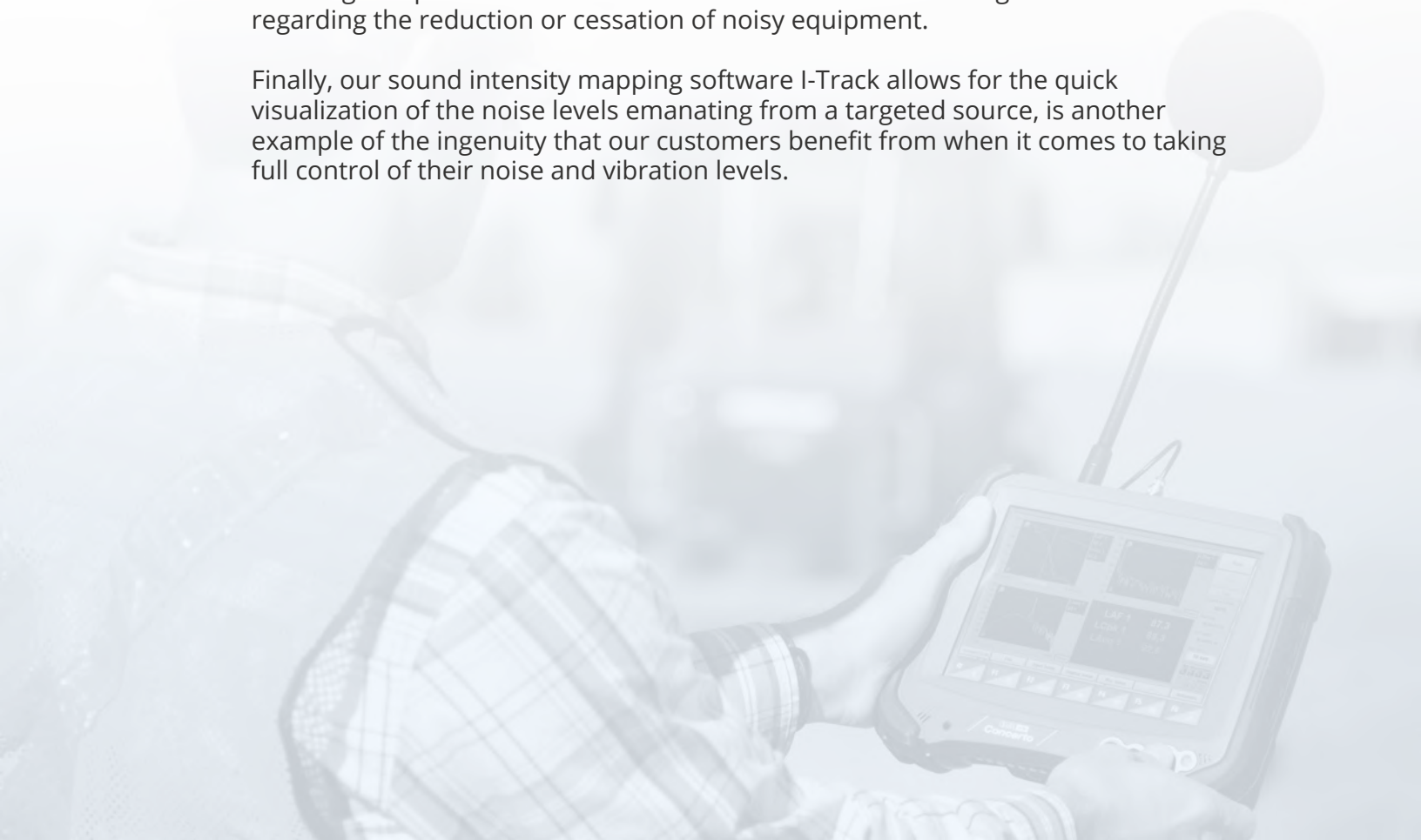
A Team of Experts in Acoustics and Vibrations

Soft dB has been helping organizations in all sectors solve their noise and vibration problems for over 20 years. Our world-class team, made up of scientists, engineers and acousticians, are constantly innovating efficient methods and techniques for measurement, analysis, and improvement of the sound and vibration environments for various types of sites.

Whether it is for construction sites, mining, industrial facilities, or commercial and residential buildings, our client approach is focused on the rapid and efficient implementation of tailor-made mitigation solutions, based on reliable and precise acoustic data collected using the best possible instruments.

In addition, we have developed a monitoring system allowing real-time monitoring, 24 hours a day, of sound and vibration levels, dust concentrations, road traffic, and weather conditions. Integrated into a secure web interface, this system allows instant notification whenever the allowable levels are exceeded, thereby continuously ensuring compliance with environmental standards and making informed decisions regarding the reduction or cessation of noisy equipment.

Finally, our sound intensity mapping software I-Track allows for the quick visualization of the noise levels emanating from a targeted source, is another example of the ingenuity that our customers benefit from when it comes to taking full control of their noise and vibration levels.



References

Noise Radar, www.softdb.com/_files/Consul/SoftdB-Consulting_Noise-Radar_EN.pdf, 2019

Method and system for noise discrimination, A. Gérard, M. Pearson, M. Poirier, P.C. Ostiguy, PCT Application No. PCT/CA2018/050416, 2018, et US application No. 62/484,061, 2017

Real-time, automated noise impact assessment monitoring of an industrial plant, A. Gérard, M. Poirier, M. Pearson, R. Mackenzie, P. Laliberté, Inter-Noise 2018, Chicago, États-Unis

Techniques innovantes pour la gestion du bruit minier, A. Gérard, M. Pearson, Conférence Américana 2017, Montréal, Canada

Techniques innovantes pour la gestion du bruit minier, M. Pearson, Conférence Québec Mine 2015, MRN du Québec, Montréal, Canada

Acoustic imaging and sound mapping of mining and transportation noise sources, R. Mackenzie, A. Gérard, M. Pearson, Canadian Acoustics, Vol. 43 No 2, 2015

MINING NOISE CONTROL & MONITORING

Soft dB

MINE CANADIAN MALARTIC