

Unlocking POTENTIAL WITH INNOVATION



Audrey Beurnier, Aramine, France, evaluates how gold mining in West Africa is being revolutionised through electrification and innovation.

The mining industry is constantly evolving, driven by technological advancements, environmental imperatives, and the relentless pursuit of more efficient ways to harness the Earth's precious resources. Aramine has recognised the significance of this ongoing transformation, and thus maintains a team of engineers in its research and development department to stay at the forefront of this change. Having achieved breakthroughs in mines located in Russia, Kyrgyzstan, Greece, Mexico, and France, the French company faced a new challenge in West Africa.

This mineral-rich region recently approached Aramine for the electrification of a major gold mine. This case study illustrates how Aramine leveraged its expertise in narrow-vein mining and operations to tackle this new endeavour in challenging conditions.

Gold mining in West Africa

Gold mining in West Africa is a complex and lucrative endeavour, with mining conditions both promising and demanding. This region of the African continent is abundant

in mineral resources, offering significant opportunities for the mining industry. However, mining in West Africa presents unique challenges, including deposits often located in remote and difficult-to-access areas. Additionally, extreme weather conditions, the necessity of adhering to stringent environmental standards, and the growing pressure to ensure sustainable mining practices make this region a complex environment for gold mining and other mining activities. Nonetheless, these challenges drive innovation and encourage companies like Aramine to develop solutions tailored to the specific conditions of mining in West Africa.

Building on expertise

Aramine, exporting for over 45 years, is known for its specialisation in small and medium-sized mines. It excels in designing and manufacturing mining equipment specially tailored to the most demanding environments. Its commitment to continuous improvement and technological innovation has allowed the development of unique solutions to solve complex problems in the mining industry. This deep expertise has been



Figure 1. The last two battery-powered miniLoader L140B delivered in West Africa.



Figure 2. Battery-powered miniLoader L140B before leaving Aramine facilities.



Figure 3. Perfect fit of a battery-powered miniLoader L140B in this narrow-vein mine.

leveraged in diverse mining projects worldwide, enabling the company to successfully meet its clients' needs and contribute to the efficiency and sustainability of mining operations.

Facing this new and complex challenge in West Africa, the company naturally turned to its commercial team to explore the possibility of recovering high-grade gold veins without the need for costly ventilation and with minimal electrical infrastructure.

An energy module replacement system and onboard charger

Several key factors motivated Aramine's choice of solution. First and foremost, the ease of use of the machine, thanks to the energy module replacement system, which naturally appealed to the client. This system ensured unlimited autonomy, as energy modules could be replaced quickly and efficiently, dispelling doubts about the reliability of electric batteries – a concern for many users. Another reassuring aspect for the client was the onboard charger, as it eliminated the need for complex electrical infrastructure in the mine. Indeed, the ability to charge the battery while a full battery is at work allows for a slow charge, reducing the cost and bulk of electrifying the mine. This was essential, given the extreme conditions in which these new gold veins were being pursued.

Additionally, the cooling system is often the weakest point of a vehicle, a concern shared by many users. However, once again, slow charging enabled Aramine's engineers to eliminate the cooling system for the energy modules because the batteries did not heat up.

Reducing underground workshop size with simplified maintenance

This also proved to be an advantage for overall equipment maintenance. Unlike many other mining machines, Aramine's battery-powered equipment required only daily checks and greasing, reducing operational costs and increasing efficiency. This had a positive impact on the size of the underground workshop needed to support this new mining operation. Not requiring a cooling system, thanks to the slow-charging embedded system, allowed for the workshop's minimisation and simplified underground operations and maintenance.

Increasing production

The success of this initial phase of the operation prompted the client to order a new series of equipment, including a machine and multiple battery energy modules, to expand its fleet and increase production. Less ventilation, simplified maintenance, and minimal electrical infrastructure all contributed to making this expansion possible.

Conclusion

This case study demonstrates how Aramine, leveraging its expertise in narrow-vein mining and operations in difficult conditions, successfully tackled a major challenge in West Africa. By using innovative solutions – such as an onboard charger, an energy module replacement system, and slow charging – the company enabled the client to recover high-grade gold veins without the need for costly ventilation or complex electrical infrastructure. This achievement paved the way for increased production and more profitable exploitation of this promising gold mine in West Africa. **GMR**