

Sense&Mine4.0

Context Aware Platform for
Ventilation on Demand in Mining

Consortium

- Emphasis DigiWorld SA, Greece
- LMS, Greece
- DELPHI-DISTOMON S.A., Greece

Sector

MANUFACTURING

Duration

12
MONTHS

Challenge

Mining companies with underground operations need to increase their operational visibility and context awareness. At the bottom line, increased visibility of air quality serves to immediately improve operations and maintenance processes and meet objectives on cost efficiency, safety and sustainability. Furthermore, operational context awareness is the basis for increased operational intelligence fine tune, process change and new business models. H&S considerations in mines are critical and workplace poor air quality may cause serious health risks. Moreover, the efficiency of workers decreases exponentially as the ventilation becomes poor. The ventilation system is a critical component of the mine infrastructure and requires optimal control to ensure the safety and the efficiency of the operations.

DIATOMIC Support

DIATOMIC services and funding support were crucial for the successful implementation of our experiment. DIATOMIC coaches provided significant guidance in every step of the project. Moreover, webinars organized by DIATOMIC Consortium helped us to find solutions and overcome challenges. Both coaches and webinars provided valuable advices on the technological as well as on the market level. Finally, the bootcamp and meetings with the other DIATOMIC experiments were a great opportunity to exchange the ideas and viewpoints regarding technology.

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Solution

The approach followed in the Sense&Mine4.0 solution is the creation of a wireless chain of IoT nodes in order to acquire and transfer data outside the underground area. Data is collected, fused, filtered, and provided to a central cloud platform for further processing. A key advantage is that it can be adjusted to any existing mine infrastructure. Sense&Mine4.0 includes autonomous data communications and requires little integration with other systems. Furthermore, the solution features easy and fast installation on the mine. The design of the solution encompassed significant engineering effort to build the equipment that can be installed by customer technical services, without particular skills. This approach minimizes deployment and maintenance cost, as compared with all the other solutions present on the market. Flexibility is also confirmed by the ability of the solution to be easily deployed independently of potential limitations/restrictions due to the mine topology. Moreover, it can be modified if needed to cooperate with existing data communication backbone networks e.g. like Leaky feeder or Wi-Fi.

Lessons Learned

We learn to use the toolchain(coaches,experts,webinars) that diatomic provide us according technological as well as market solutions.

We are following the evolution of the crisis very closely, so we will be able to update our market plan. Furthermore we started differentiate our solution to fulfill air quality monitoring requirements of other industrial environments.

TRL & Adopters

TRL level at the beginning of the experiment: **4**

TRL level at the end of the experiment: **7**

Number of early/first adopters raised during the experiment: **1**

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Timeline

Our experiment began with Design phase in May 2019 in which we set the specifications and requirements of the experiment. These specifications were the outcome of discussions with mine companies in order to understand the industry needs. After 2 months of Design phase, we continued the Experiment with the Development phase. This phase included technological development and field test at Delphi-Distomon mine. Following the successful pilot test, the Market phase begun in March 2020. In this phase we defined our strategy for the Sense&Mine4.0 market launch.

Stakeholders

Sense&Mine4.0 project coordinator Emphasis DigiWorld applies industrial Internet of Things (IIoT) and cloud solutions to optimize operational intelligence in mining, cement and aggregates and manufacturing industries.

The Laboratory for Manufacturing Systems & Automation (LMS) is oriented on research and development in cutting edge technology for the optimization of manufacturing processes.

The pilot was deployed at DELPHI-DISTOMON S.A, which is one of the largest bauxite producers in Europe.

End Users

Sense&Mine4.0 solution end users are mainly mining companies with underground activities. Delphi Distomon ordered a new installation of Sense&Mine4.0. The first commercial deployment was scheduled in June 2020.

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Key Results

Comply with Y2023 mine regulations for air quality; Save up to 18% of ventilation energy; Save cost on data collection and certification; Possibility to integrate with existing infrastructure; Energy saving in the ventilation system usage approx. 18% energy gain; Reduce effort spent for measuring gases in the mining approx. 98.3% reduced effort; Real-time air quality measurement linked to UG operations context; Optimized ventilation control based on dynamic environmental conditions.

“As a service” market model. Monthly service fee includes: Sense&Mine4.0 equipment rental; Wireless data communications infrastructure rent and use; Cloud platform hosting; Technical support.

Other services include: Engineering services for the technical deployment; Engineering services for the solution setup; and User and local support team training.

Impact

A key market trend is that operational intelligence requires an integrated approach combining technology for air quality management with mine process restructure. The Ventilation on demand (VoD) solutions are very critical and promising for mines, especially under increasing environmental conditions awareness. Given the constantly growing demand across the base metals industry, a continuous increase in production is expected to match those needs. Increased underground production, as well as the necessity of developing new underground mining projects, suggests that the underground market will be developed dynamically in the coming years. The compound annual growth rate (CAGR) of revenue in this market is estimated at 6.1% until 2027.

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Testimonials

“Sense&Mine4.0 dramatically reduces the effort spent for measuring gases in the mine. It makes it possible to real time monitor the mine air quality from my office and from my mobile.

— Tzimopoulos Xaralampos, Production Manager at Delphi-Distomon

“Sense&Mine4.0 provides us excellent services regarding health and safety issues in the mine. This system is a lifesaver as it is continuously monitoring that miners work under the best possible conditions.

— Papanikolaou Ioannis, Worksite Manager at Delphi-Distomon

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