



European Mining in the Green and Digital Era

2nd Press Release

La Zarza mine: MASTERMINE solution for hydrological balance

The hydrogeological balance of the La Zarza mine, owned by Tharsis Mining, has always been a critical factor to control. La Zarza mine, an ancient Roman mining site, underwent open-pit and underground mining operations from the 1st century B.C. until 1991, when it ceased activity. The mine's potential reopening is currently under investigation due to the discovery of valuable ore deposits.



Photo of La Zarza mine



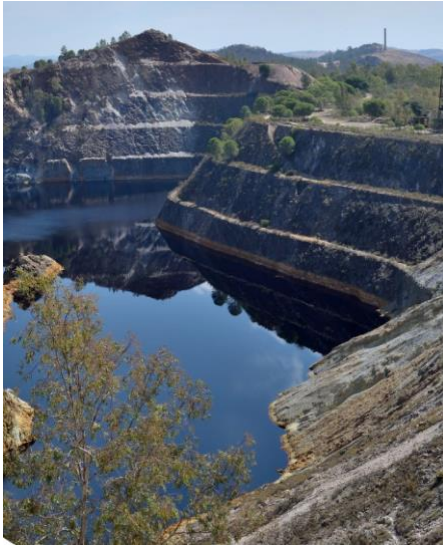
Historic photo of La Zarza mine

Since 1991, the open pit of the La Zarza mine has been inundated with thousands of cubic meters of water, making the hydrology of the area a paramount concern.

Thanks to the MASTERMINE project, the hydrological balance of the mine can be meticulously monitored and managed. A variety of instrumentation has been strategically installed throughout the mine to facilitate this endeavor. The primary goal of this instrumentation is to establish early warning systems for hydrological management to intervene in time and avert potential environmental mishaps. In this manner, the mine is remotely controlled and monitored.

Key installations include:

1. A **hydrostatic sonde** installed in a shaft that connects to the water level of the open pit. In this way, the measurement that was previously taken by regular topography is now taken automatically and with higher precision. Thus, the water level is continuously controlled, and it is possible to observe how it is affected by different meteorological phenomena.



San Pablo open pit, La Zarza mine



Hydrostatic sonde

2. **Automatic movement sensors** to control subsidence in the Los Cepos embankment, replacing the previous method of regular topography. As a result, potential subsidence in the area will be automatically controlled, and the condition of the embankment will be continuously monitored.



Automatic movement sensors



Equipment drilling the 40 m long hole for the piezometer

3. A **piezometer** deployed within the gallery connecting the La Zarza mine open pit to the Los Cepos embankment. As a consequence, the water pressure inside the gallery can be monitored, which was not previously possible. The variations in the gallery conditions can relate the changes in the water level of the open pit to the modifications in the Los Cepos embankment.

4. A **water flow measuring station** installed on the La Algaida creek. This station is similar to the one on the Los Cepos creek, close to the embankment. Both stations help to control the flow of the existing natural discharge that comes from the water of the open pit of La Zarza mine.



Water flow measuring station



Meteorological station

5. A **meteorological station** to obtain much more precise information on the meteorological conditions at the La Zarza mine. This information complements the data from the previous instrumentation.

The comprehensive data collected through these installations will enable the partners involved in the MASTERMINE project to develop an application that analyses and processes information. This will culminate in a predictive system capable of issuing alerts in the event of alarm conditions and allowing timely intervention.

About the project

MASTERMINE is a 4-year Horizon Europe co-funded project which aspires to become the go-to ecosystem for mines that envision digitalisation, environmental sustainability, productivity monitoring and public acceptance within their strategic goals. The focus will be on an Industrial Metaverse (IM) approach to build a digitalized copy of a real-world mine.

The project will demonstrate its applicability in 4 EU demo cases and one replication demo in South Africa. The mining partners offer access to a total of 10 mines around Europe, producing 10 different raw materials, including 4 CRMs (Cobalt, Coking Coal, Phosphate Rock and Platinum).

MASTERMINE consists of six high-level modules:

- CYBERMINE: Leading the digital transformation of EU mines.
- AUTOMINE: Establishing autonomous and electric operations along with smart monitoring and maintenance.
- GEOMINE: Ensuring safety and stability in critical structures.
- GREENMINE: Enhancing the environmental sustainability of the mines.
- METAMINE: Building the first mining metaverse of the EU mines.
- OURMINE: Connecting the mining industry with the surrounding community to build trust and foster social innovation.

Project title: European Mining in the Green and Digital Era

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