DINAMINE

DIGITAL AND INNOVATIVE MINE OF THE FUTURE

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Results from the first year of activities

The DINAMINE Project is about to embark on its second year of implementation, and the first year of activities has been marked by numerous accomplishments. Dive into this newsletter to explore the strides made by the consortium and gain insights into the upcoming milestones.

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Work Package 1: Integrated Smart Mine Planning and Managing Platform (ISM-PM)

Over the first year, activity towards development of the ISM-PM system has been quite high as the project partners studied the needs of the end users, while developing the software architecture of the system. Worldsensing led the efforts to achieve the first milestone in the project in June 2023, which included delivery of the system requirements and specifications, laying the groundwork for continued developments of software modules by several of the project partners.t Parameters for real-time monitoring were identified and sensors were selected to be installed on the pilot sites over the next year.

Work Package 2: Exploration and geo-models

The first year of activities included conducting petrophysical laboratory measurements on over 200 meters of rock core samples from mining industry partners Felmica Minerais Industriais (Portugal) and Skaland Graphite (Norway). The core sample measurements include electrical resistivity, Induced Polarization effect, density and magnetic susceptibility. In addition, Norwegian Geotechnical Institute worked together with TEMcompany of Denmark to use a geophysical exploration technique at the pilot site in Portugal. A near-surface electromagnetic surveying method with a maximum penetration depth of 60 meters was used to map the subsurface within the licensed exploration areas. The results of the surveys will be used to build a reliable geological model for future planning of near-mine exploration activities. To integrate the petrophysical and geophysical data and other data sources, a mine information data model was developed with the ability to communicate with the software systems in the ISM-PM.

DINAMINE team conducted geophysical exploration methods at the pilot site in Portugal

Work Package 3: Development/Exploitation

To begin developments of the technological modules that support mine development and exploitation, Norwegian Geotechnical Institute and AMV begun developments on hardware design and acquisition and supporting software developments. Notably, advancements were made towards realization of a semi-autonomous drilling jumbo technology that will be deployed on site in the project.

DINAMINE partner AMV is developing a new drilling jumbo technology that will be deployed at the Norwegian pilot site

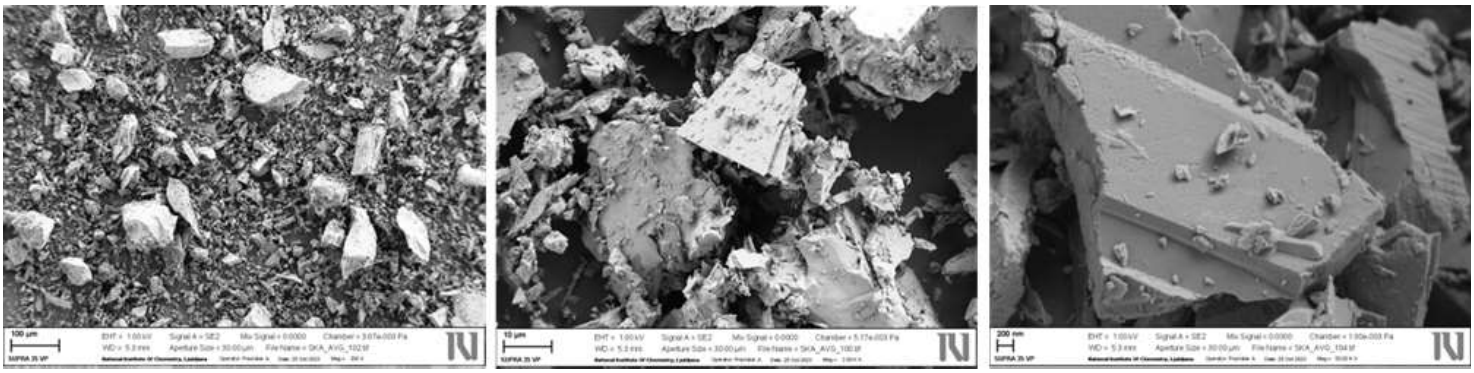
Work Package 4: Processing

In the first year of the project, the partners gathered the requirements for developing the mineral processing model, and defined its high-level design. Background and baseline data have been collected and coding activity has been started to model the data. The focus of baseline assessments was in determining the carbon footprint of the pilot site mines. The calculations, based on historical data, considered the impact of the mining equipment, the crushing plant and the optical sorter. The carbon footprint of the main energy sources, including fuel and electricity, was assessed for data available from the previous years' operation. The results provided a valuable insight into the environmental

impact of mining activities. Other aspects of the work completed to date related to the development of the Laser-Induced Breakdown Spectroscopy (LIBS) sensor technology for the pilot sites. Requirements for on-site deployment of the technology were gathered, including the details on the processes and components in the production plants. The initial design for the sensors has been finalized and developments are in progress.

Work Package 5: Reclamation

The first year of work related to Reclamation provided an insight into the chemical properties of tailings from both the Skaland Graphite and Felmica Minerais Industriais pilot sites. Electron microscopy analysis revealed morphological features for all samples – with measurements ranging from a few hundred nanometers to a few tens of micrometers. In addition to electron microscopy, elemental analyses and X-ray diffraction spectra were also collected for the samples. The spectra comparison of the samples revealed similarities with specific compounds and played an important role in understanding the composition of these mining wastes. These findings are central to the formulation of possible reclamation strategies and contribute to the responsible and effective management of mining by-products.



Electron microscopy of the tailings

Layered image of energy dispersive X-ray spectroscopy for the elemental analysis of tailings

Work Package 6: Impact assessment

Over the initial year, the Impact assessment team delved into the requirements and specifics of the use cases tied to the sustainability, Life Cycle Inventory (LCI) data, and the impact assessment framework. The critical undertaking of this period was the establishment of a deep understanding of the operations associated with the pilot site mines and processing plants. The understanding is needed to establish a robust methodology for designing the dynamic life cycle assessment models. A focused effort was made into mapping site processes, developing the data collection format, and testing preliminary database models, resulting in the team selecting a foundational LCI database model. Alongside this, the team established detailed specifications to guide the subsequent development of sustainable assessment tools, ensuring alignment with predefined parameters and real-time monitoring needs. Transitioning into the development phase, the team is now steering efforts toward the actualization of the sustainability assessment tool and the further implementation of the integrated LCI database.

Work Package 7: Communication, Dissemination and Exploitation of Results

During the first year of project development, Ciaotech – PNO Group, in charge of WP7, has been facilitating both exploitation and communication and dissemination activities. On the exploitation side, the core activities carried out consisted of market and stakeholder analyses. This began with a thorough desktop search using Ciaotech's proprietary IT tools to collect a corpus of relevant data, conduct market and innovation intelligence analysis, and to identify key stakeholders. The results gathered to date allow the DINAMINE team to pinpoint leverage points for an effective market strategy and commercialisation of the project results. The stakeholder analysis was recently completed and helps identify key opinion leaders to interview for insights on the reality of the market. At the same time, Ciaotech has worked with the DINAMINE partners to successfully develop the project channels, materials, and tools supporting the dissemination, communication and exploitation strategy used to disseminate news and raise awareness about the project. Want to discover more? Take a look at the DINAMINE website!

EVENTS

DINAMINE project meeting in Oslo, Norway

On October 3-5, 2023 the project consortium gathered in Oslo (Norway) for the first General Assembly of the project, aimed at reviewing the progress made from the beginning of the project. Each partner had the opportunity to present the results achieved in their tasks and Work Packages, and to discuss with the whole consortium the next steps towards reaching the project's goals.

The DINAMINE consortium met in Oslo, Norway

DINAMINE showcased at Ecomondo 2023

DINAMINE participated in ECOMONDO, the benchmark event in Europe for technological and industrial innovation in the field of green and circular economy, which took place in Rimini (Italy) from November 7–10, 2023. The project was displayed in the CiaoTech – PNO Group hub of projects. At the CiaoTech booth, the REACTIV and GREENPEG projects were also displayed. These are DINAMINE-related projects with which a collaboration to boost the visibility of their processes and technologies towards a more sustainable Europe has just begun!

DINAMINE (left) and REACTIV (right) projects were showcased at Ecomondo 2023

Project members attended the autumn meeting of the Norwegian Mineral Industry association to learn and share about sustainability in the mining industry

Stay tuned for more updates as we embark on our mission to create a mining industry that is greener and more sustainable!

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