DEVELOPING RESILIENT BIO-INSPIRED MODULAR ROBOTIC MINERS

ROBOMNERS

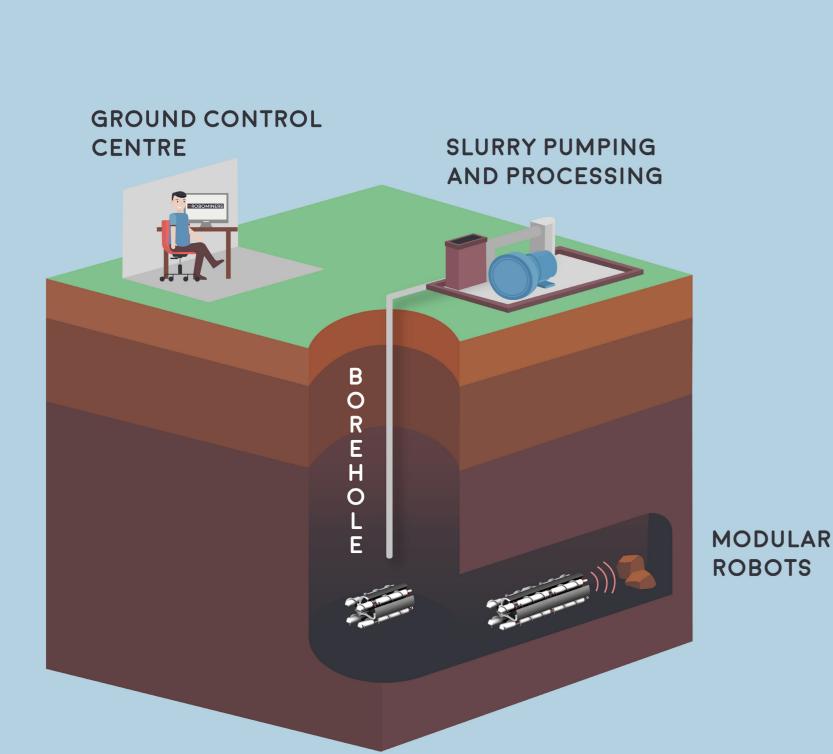


ROBOMINERS is a 54-month Horizon 2020 project funded by the European Commission that started on 1 June 2019. ROBOMINERS will develop a bioinspired, modular and reconfigurable robot-miner for small and difficult to access deposits. The aim is to create a prototype robot that is capable of mining underground, underwater in a flooded environment, and can be delivered in modules to the deposit via a large diameter borehole drilled from the surface to the mineral deposit.

ROBOMINERS aims at delivering a proof of concept for the feasibility of this technology line at Technology Readiness Level (TRL) 4. The technology could enable the EU to access mineral raw materials from domestic sources that are otherwise inaccessible or uneconomic.

CONCEPT

- Robot parts (modules) are sent underground via a borehole
- They self-assemble to form a fully functional robot
- Using specialised sensing devices, they detect ore
- Using ad-hoc production devices, they produce slurry that is pumped out
- They can re-configure on-the-job



VISION ROBOMINERS

Demonstrator for modularity, self-ROBOTICS Full autonomy, self-reconfiguarbility, First industrial pilot, tethered, assembly, perception and navigation, self-awareness collective robots semi-autonomous operation resilience in extreme underground environments SELECTIVE MINING New mineral perception, detection and classification, as well as new First industrial pilot application Autonomous mining production tools, demonstrated to TRL Study of mining ecosystem of First industrial application in a Industrial applications in MINING ECOSYSTEM downstream and upstream processes, "small deposit scenario" or "ultra-depth" scenarios identify research challenges for ,abandoned mine scenario" with on-Small mines deliver a considerable logistics, environment, mineral site minerals processing and share of the EU's critical minerals processing, borehole drilling paste refilling production technology, dredging & pumping

2030 VISION

Financial viability assessment, sustainability, environmental and for small-scale mining ethical considerations Supporting policy and legal Research roadmap for development of framework for small-scale mining supporting technologies

Simplified permitting procedures

New innovation ecosystem: SMEs and entrepreneurs are working towards further miniturisation and versatility

2050 VISION

IMPACT

- Opening new exploitation scenarios for Europe's domestic mineral resources
- Supporting the transformation of mining into a high-tech digital industry, capable of attracting young scientists and engineers and reducing the gender gap
- Increasing domestic supply of raw materials, especially for Critical Raw Materials (e.g. Li, Co, graphite etc.)
- Environmental benefits, such as no dewatering needs, no personnel in the mine, less waste, reduction of necessary groundworks on surface
- © Enabling small-scale and artisanal mining, promoting the development of small and very small mining businesses
- A number of over 1500 potential mine sites for ROBOMINERS technology have already been identified
- 1 Investments in the development of a new mining project will be much smaller compared to conventional underground mining, at the benefit of quick return on investments
- Potential to be adapted to extra-terrestrial environments



SUSTAINABILITY ASSESSMENT

PARTNERS

