

Press release

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Research project Deep Sea Sampling nominated for the Bauma Innovation Award in the Research category

Freiberg, Germany - Whether copper, cobalt or rare-earth metals, the global demand for these and other raw materials is tremendous and will continue to grow in the coming years. This development is accelerated by major trends such as electrification and the energy revolution. To cover the demand for raw materials, existing capacities must be expanded, and new deposits developed. There is great potential in previously unexplored deposits (for example of massive sulfides) in the deep sea, i.e. at 2000 m or more below sea level. Nevertheless, new equipment and technologies are required for their exploration and extraction – precisely the focus of the joint project Deep Sea Sampling, subsidized by the Federal Ministry for Economic Affairs and Climate Action (Bundesministerium für Wirtschaft und Klimaschutz, BMWK) and now also nominated for the Bauma Innovation Award.

The project partners are the TU Bergakademie Freiberg (Freiberg University of Mining and Technology), with its institute for treatment equipment and recycling system technology as well as its mechanical engineering institute, the University of Rostock, FAU Erlangen-Nürnberg along with Krebs & Aulich GmbH and BAUER Maschinen GmbH. The Federal Institute for Geosciences and Natural Resources (Bundesanstalt für Geowissenschaften und Rohstoffe, BGR) as well as the Deep Sea Mining Alliance (DSMA) are also represented on the project support committee.

“The topic of deep-sea mining is more relevant than ever and requires an assessment of potentials and effects across all professional disciplines. This research project makes an important contribution in that regard,” remarks Prof. Dr. Martin Sobczyk from the Mechanical Engineering Institute of the Freiberg University of Mining and Technology.

“For the exploration and future sustainable extraction of massive sulfides in the deep sea, there is a very promising approach based on the cutting technology that has been successfully applied in specialist foundation engineering for a long time now,” explains Dr. Matthias Semel, coordinator for the overall project from BAUER Maschinen GmbH.

The research project was launched in 2021 and is scheduled for completion in 2024. The goal is instead of using a surface approach for the extraction of raw materials, to electrify a compact trench cutter and transform it into a smart, semi-automated vertical mining unit. “This unit separates and characterizes the extracted material during the mining process directly on the sea floor,” continues Dr. Matthias Semel. This should not only ensure a minimally invasive, efficient mining of resources, but also capture turbidity clouds generated by the work in a closed, shielded process.

When developing such an innovative technology, numerous factors must be considered: Conditions on the sea floor include water pressures of up to 400 bar, complete darkness and temperatures around 1°C – enormous challenges for equipment technology. This is accompanied by the composition of the massive sulfide deposits with their rugged surfaces

and extreme slope gradients. “There are still many unknown aspects about the conditions on site – much like a space mission,” mentions Stefan Wegerer, project coordinator at BAUER Maschinen GmbH. “Over the course of the research project, apart from the technological implementation, the ecological interactions will be investigated and new fundamental knowledge gained. The goal is to reduce the effects on the environment to a minimum.”

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(1) The use of an electrically driven vertical mining unit aims to achieve minimally invasive extraction of resources in the deep sea. © BAUER Group



(2) The unit is brought to its place of deployment by ship. © BAUER Group

About the Freiberg University of Mining and Technology:

Innovation, Industry 4.0, the Internet of Things or e-mobility: all of our modern developments require resources, energy and materials, as well as sustainable ways of managing them. At Freiberg, that's why we are engaged in excellent research and teaching about the foundations and processes relating to resources, energy and materials. To accomplish this, we bring together all the specialist areas of engineering, natural sciences, geosciences and economics under one roof. As a result, the university ensures not only varied research, but also corresponding systematic training of its students. Learn more at <https://tu-freiberg.de/>

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For nearly 60 years, Bauer equipment has represented the highest performance and quality as well as constant innovation. The BAUER Maschinen Group is the world market leader in the development and manufacture of specialist foundation engineering equipment. At the Group's headquarters in the Schrobenhausen, Aresing and Edelshausen plants, BAUER Maschinen GmbH – also a holding company for numerous subsidiaries – designs and constructs large rotary drilling rigs, duty-cycle cranes, trench cutters, grab units and vibrating equipment as well as all corresponding tools. Equipment for small hole drilling and well drilling is manufactured at the subsidiaries, along with highly modern equipment in the area of mixing and separation technology. The BAUER Maschinen Group operates additional production sites in the USA and Russia, in China, Malaysia, Italy, Singapore and Turkey. Suppliers within the Group are Schachtbau Nordhausen and Olbersdorfer Guß. The company has a global network for sales and customer service. Learn more at bma.bauer.de

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