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Conceptual design of underground laboratory under dynamic load condition in deep copper mine

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Underground laboratories, due to their unique location, are facilities with high research and educational potential. Development of old mine chambers or setting up of new mining panels designed strictly for research and educational purpose may contribute to the development of new mining technologies. One of the initiatives aimed to enhance of the underground space usage in Europe is BSUIN project conducted in the framework of INTERREG Baltic Sea Region program. At the moment there is only one underground laboratory designed fully for research and development purposes i.e. Experimental Mine Barbara lead by Central Mining Institute of Poland. But still, there are several dozen active underground mines working in Poland. Unfortunately, the large scale of the mined-out area contributes to the generation of relatively high seismicity around mining regions. Due to safety reasons management of Polish underground mines in most cases do not allow to build such a facility like underground laboratories in close vicinity of active mining works.

Within this paper, the prototype of an underground laboratory affected by additional seismic load was prepared in condition of Polish underground copper mine. Changes in total displacement and stresses around newly created chambers with use of FEM-based numerical modelling were determined. In result possibility of setting up of underground facility under dynamic load condition was determined.