A development of empirical model of destruction of compact rock in a complex spatial stress, caused by a force applied to the string fixed by the expansion component in a rock wall, is a scientific objective of the project. The stress means the strain of rock, which has not been a research object so far, and a model of rock destruction enabling determination of critical force and geometry of falling off has not been described in the literature. There is no universal strength criterion for inhomogeneous rocks and materials. Several criteria for strain assessment should always be used, taking into account the mechanisms of destruction through compression, shear and tension, as well as selected strength criterion should be in accordance to experimental results [18]. Within the project, it is planned to develop innovative device for testing the rock strength, which will be applied in in-situ tests, and the test results will be used to develop numerical simulations and empirical relationships determining the mechanism of rock destruction.

The following work will be carried out within the project:

1. Analytical and designing work aiming at development of testing device, including development of 3D model of the device, strength calculations of the structure and development of technical documentation, on the basis of which the device will be manufactured. Instruction of the device and testing methodology will also be developed at this stage of work.
2. In-situ tests at test stands in mine workings, including testing of at least three different types of compact rock with use of developed device. During the tests the expanding device will be installed at different depth and force during falling off will be recorded. The rock wall will be painted to make the falling off surface visible. The falling off geometry will be measured with use of 3D scanner. At the same time the laboratory measurements of strength parameters of rocks will be taken on samples prepared from pieces of rock fallen off during in-situ tests. The tests will include determination of limit resistance to uniaxial compression, limit resistance to uniaxial tension, cohesion in shear test at compression, cohesion in direct shear test and angle of interparticle friction.
3. Analysis of collected experimental data with use of statistical methods to limit such factors of variability as measuring errors, impact of material heterogeneity and estimation of uncertainty of test results.
4. Numerical simulations, including selection of solid materials and strength criterion to adjust analytical results to the experimental results as much as possible.
5. Development of empirical model of rock destruction in a form of consistent relationships, including strength parameters obtained in basic laboratory tests.

Theoretical and research work carried out so far and planned will enable enrichment of knowledge on strength of compact rocks in environment of complex stresses. The basic tests will enable to develop an empirical model of rock destruction in action of complex stresses, what was not tested before. The unique testing methodology as well as facility for testing the rocks to determine strength parameters of rock wall in *in-situ* conditions will be developed. Knowledge gained during project realization will be used in development of innovative technology of cutting the compact rocks, which would be an option to conventional mining with use of explosives. Besides knowledge on strength of roof bolting will be extended. The project results will help to bring new content to the disciplines such as geomechanics and geotechnics, raising awareness and opening up new directions for further work.