The three-dimensional slope stability analysis, 3D has numerous advantages over the two-dimensional 2D

The paper “Application of 3D slope stability analysis in defining the conditions of coal in open cast mining”, by Gordana Hadzi – Nikovic, Slobodan Coric and Jagos Gomilanovic, pointed out that three-dimensional slope stability analysis, 3D has numerous advantages over the two-dimensional, primarily, due to a more realistic view of the slope geometry and sliding surfaces, but also respect the lateral force resistance at the peripheral sides of the slope. Based on numerous 2D analysis, by Morgenstern-Price method, certain critical slip surfaces, and then for them, a certain 3D safety factors are determined, respecting lateral resistance on the sides of excavation slopes.

Based on the results of 3D stability analysis, excavation performing by zones, is proposed, and for each zone are defined the mining bench width, and the safe distance from excavation to the frontal part of the slope. The size of the safety factor, obtained from the comparative 2D and 3D stability analysis, clearly shows that if, during the excavation 3D conditions are realized, as is the case with bench excavation, then greater quantities of coal can be excavated, much more than when excavation is done in 2D conditions of stability .

Results of completed 3D slope stability analysis of the open pit mine, have shown that it is possible, from the geotechnical aspects, to make a rational coal exploitation, even after the occurrence of local instability on open pit mine slopes.

With the help of 3D slope stability analysis, is proposed as follows: excavation surface to be divided into three zones, and the excavation of coal to be carried by mining benches of certain width in each zone, thus take into account the conditions of the open pit slope stability and technologies of coal excavation.

Mining bench width in each zone, enabling, as activation required of lateral resistance of slope movement, i.e. the 3D realization conditions, and the smooth operation of machinery during coal excavation.

A minimum distance between the front part of the slope and the final excavation slope, i.e. length of safe excavation slope, provides the necessary safety of the open pit slopes.

The size of the safety factor, obtained from the comparative 2D and 3D stability analysis, clearly shows that if, during the excavation 3D conditions are achieved, then much greater coal quantities may be excavated, of than when excavation is done in 2D stability conditions of. In this way it may be excavated an additional 60,000 tons of coal, i.e. coal from all three zones and that part of the open pit is closed. This fact confirms the validity of the methodology we used for solving the problem of open pit mine slope stability.

Finally, the authors pointed out that the successful resolution of this and similar problems,

requires good cooperation of mining engineers and geo-technicians engineers.