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Three-dimensional model as the basis for exploration planning (as an example, the Prutivka copper-nickel deposit)

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SUMMARY

The area of use of the three-dimensional deposit model depends on the confidence and accuracy of the initial data. Models based on retrospective (historical) data can be used to prospective assessment of the deposit and exploration work planning. These capabilities are demonstrated by the example of the Prutivka copper-nickel deposit.



Figure 1 *Spatial database of retrospective (historical) data of the Prutivka deposit*

A three-dimensional model of the deposit was created based on a spatial database (figure 2). Wireframe modeling methods were used to create the model, as an alternative to block modeling, considering the quality of the initial data. The ore body was contoured based on the nickel equivalent grades calculated taking into account the current prices of nickel, copper and cobalt, and each commercial component yield during enrichment. The ore body is presented as a single framework, the commercial component grades was calculated by the average-weighted method. Such approaches don't allow us to estimate the local distribution of commercial components within the ore body, but they can outline it and estimate the resources of ore and individual metals over the deposit as a whole.

Figure 2 *Frame modeling of the Prutivka deposit*

Obtained data are quite sufficient for planning further exploration work, namely, a drilling program design for deposit exploration and planning other necessary studies.

The drilling program for exploration of the Prutivka deposit was compiled on the basis of a three-dimensional model, taking into account international requirements for the initial data and resource classification. Three-dimensional surfaces of the rocks and the ore body boundaries were used to determine the scope of drilling and separation of rocks by categories of drillability for the drilling specifications.

The drilling program consists of three stages (Figure 3). Holes with the shallowest mineralization will be drilled by wide drill hole spacing at the first stage to verify mineralization parameters at shallow horizons. The second stage involves drilling deeper holes by wide spacing for exploration of deep horizons. The third stage will include holes of infill drilling for exploration of priority mining blocks. The site for drilling holes of the third stage will be selected taking into account the results of the previous two stages. The position of individual drill holes can be corrected taking into account already obtained drilling results.

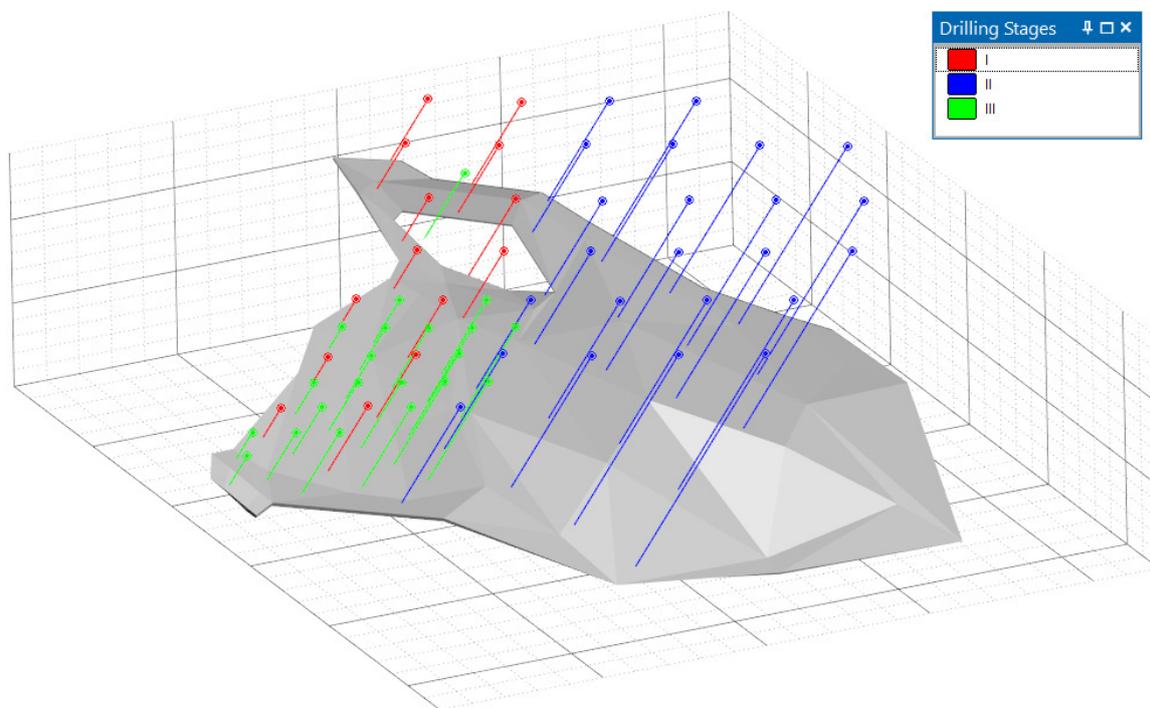


Figure 2 Project drill holes according to the drilling program of the Prutivka deposit

It is planned to create a database of exploration holes and updated block model of the deposit with resource estimation based on the drilling results and laboratory testing in accordance with international requirements.

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