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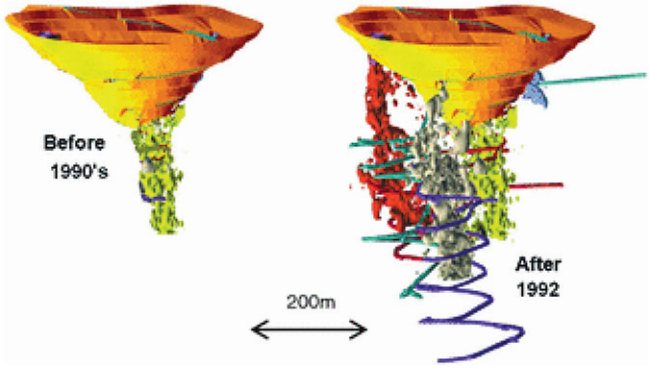
Trust orebody modelling; it can extend life of the mine and can save jobs: integrity, quality, details, experience and knowledge matter in success

A 3D model of a mine in Massif Central (France) is the point of discussion. Before 1990, the mine was considered as a sub-vertical mineralized socket (yellow) exploited in an open pit (orange). At a given depth of the open pit, the exploitation of the deeper levels would have required the enlargement of the open pit and the extraction of a huge amount of waste rock. Given the high stripping ratio, it was considered as non-profitable, and the owner company decided to close the exploitation. Before closing, they integrated all the available drill hole assays from more than 1000 drill holes into a unique 3D model on GOCAD, and used them to estimate the grade using the Discrete Smooth Interpolation (DSI) method. (Discreet smooth interpolation is also a kind of spatial data interpolation method, which is proposed by Professor J.L. Mallet from French Nancy University. At present it has become core technology of a famous geological modelling software called GOCAD. The basic content of DSI is to target a series of discrete objects into bodies of geometry and physics properties of the node, and establish the network transform known geological information to linear constraints, by solving linear equation to calculate the unknown nodes of attribute values. This method is especially suitable for building complex model and the model of discontinuous surfaces. The main process is based on the numerical of known points iterative calculation out the unknown point value, through controlling the steps of iterations can control the accuracy of surface.)

To their surprise, the DSI method pointed out unknown sub-vertical mineralized sockets confirmed by additional drillings. Given the huge in situ tonnage in place (about 6600 tU @ 0.56% U) and the structure being open at depth, the company decided to sell the deposit to another company instead of closing the mine. This saves jobs and mining activity in the region and extended the life of mine by 10 years (this mine was among the most recent mines to be closed in France). The new company converted open-pit extraction into an underground mine exploited at >400 m depth. This short success story demonstrates that: (i) there could still be mineral resources at depth even in mature mining districts (typically for U, French mines were mined to than 100–200 m depth); (ii) 3D modelling can extend the life of mature mines; (iii) innovative technologies can maintain and create jobs.



Geomodelling a mine in Massif Central (France). The mine was considered as a sub-vertical mineralized socket (yellow) exploited by open-pit (orange) (left). After integrating all the available drill holes and modelling the mineralized zone, two major mineralized structures (red and grey) were discovered (right). The mine was then exploited underground (galleries in blue and violet) for an additional 10 years.

Reference and courtesy: PärWeihed (Ed) 3D, 4D and Predictive Modelling of Major Mineral Belts in Europe, 2015, Springer