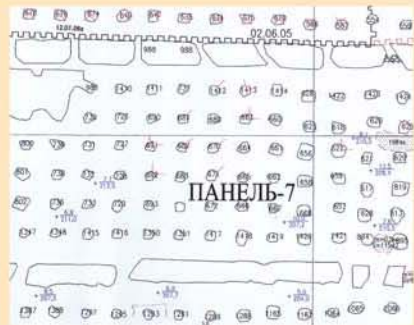
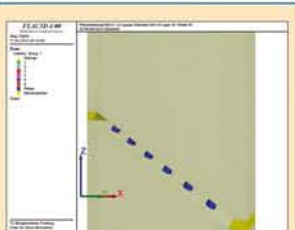


In the Dseskasgan Area (Kazakhstan), copper is mined since decades under difficult geotechnical conditions using the room and pillar method. In this work the stability of pillars in inclined mining as well as in retreat mining with 30 m high rooms will be analysed.



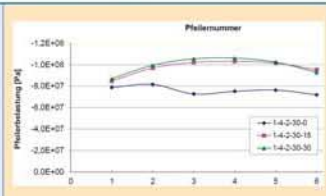
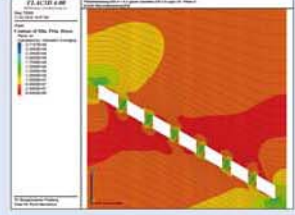
Stability analysis and "Flake off" phenomenon on pillars

Geomechanical stress situation is influenced by extremely high lateral stresses. Caused by the inclination of the mining an orientation of the pillars by "flaking off" is observed.



The mining is modelled in 500 m depth. Six pillars with an system area of 20 x 20 m and two barrier pillars are illustrated. The pillar height is 8 m.

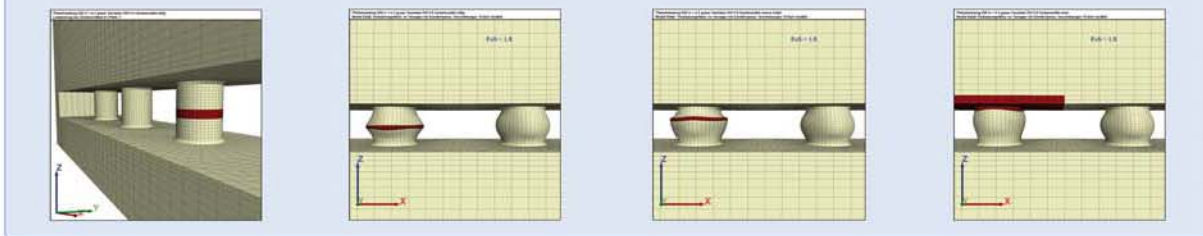
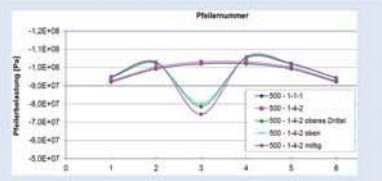
This decomposing phenomenon observed on the pillars in the mine could be explained by stress and plasticity states. The compression stress in the pillars was orientated perpendicular to the mining.



Variants with mining inclinations of 15°, 30° and 50° were calculated and the load in the pillar registered. Pillars not orientated to the mining showed clearly lower bearing capacity, caused by "flaking off".

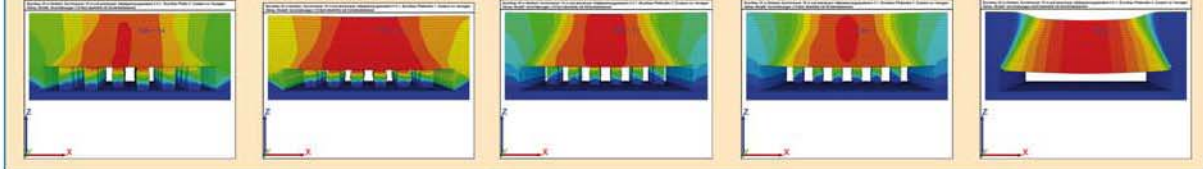
Stability analysis and deformation of pillars with geological stratum

Layers of soft sandstone are common in the copper deposit. The influence of these layers on pillar stability was investigated. The layers were situated in different heights in pillar number three. The results show a reduction of the bearing capacity of the affected pillar, nevertheless the global stability was not affected, because neighbor pillars can bear the additional load (see diagramme). Depending on the distance to the barrier pillar the cross-over compression stress in the pillar was 94 to 108 MPa.



Mining retreat with 30 m high mining rooms

Pillars in old mining areas do have a high copper content and therefore attractive for mining. The pillar volume is 25% of the total volume. The feasibility of a room and pillar retreat mining is investigated. Pillars are retreated successively. After the retreat of the 2nd pillar row, stability is affected negatively, since the load can be beared partial by the barrier pillars. After retreating the 3rd pillar row, the collapse of the roof is initiated by mayor displacements, whereby the collapse is limited on the area without pillars.



Kammer-Pfeiler-Abbau (Kupfer) Abbau in horizontaler und geneigter Lagerung

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