ITASCA Consultants, s.a.s.

MODELING MINE DEEPENING

Purpose(s): To verify that a mine-deepening project will not result in instabilities,

Client: Gipéa

Date: 2006

Place: France

Partners: None

Project executive manager: Céline Bourdeau

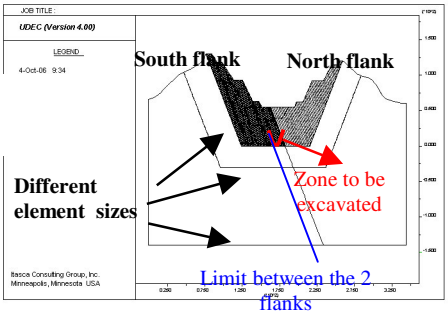
Software used: *UDEC*

Within the framework of a 15-m deepening of a limestone mine, Gipéa was asked to guarantee the **stability of the South flank**, considered to be the most critical point for future exploitation, as it is composed of **subvertical joints parallel to the slope face**.

Because the mine is striking East-West and fracturation is essentially perpendicular to that direction, the phenomena can be analyzed in 2D: thus, the South and the North flanks will be considered as "infinite" in the East-West direction. In order to **verify that the mine-deepening project will not result in instabilities**, Gipéa asked Itasca Consultants SAS to conduct numerical analyses with Itasca's *UDEC* software, the most appropriate tool for studying fractured media.

ICSAS assessed the evolution of displacements and stress fields during mine deepening, and looked for details in zones that have concentrated large displacements, or excess compression and/or tension that could lead to failure.

*Fig. 1: UDEC model showing the topography of the mine, the 2 flanks and the **joint sets characterized by a 80° dip angle**. Joints, which were modeled only in the vicinity of the slopes, are critical for the stability of the South flank, as they are parallel to the slope face.*



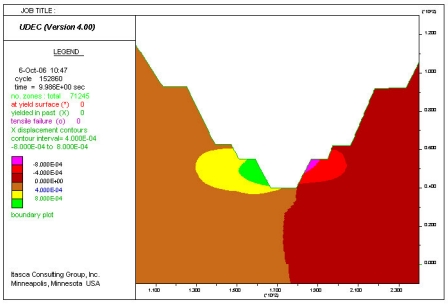


*Fig. 2: The horizontal displacements **induced by the excavation** are restricted to the lowest benches of both flanks. They will not induce slope failures because they are smaller than 1 mm.*

KEYWORDS:
- Joint sets

⇨ ***RESULTS:***

- Considering the properties used in this study, both flanks are stable. Therefore, mine deepening can be conducted.
- Failure mechanisms are not the same in both flanks**: sliding along the joints** and development of an horizontal fracture at the base of the slope for the South flank, and **bending of the joints** toward the South flank, inducing sliding along the joints and tractions inside the rock mass for the North flank.

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