Research, numerical investigations and the development of a methodology for longwall mining at a potash deposit

CIVIL • ENVIRONMENTAL • MANUFACTURING • **MINING** • OIL & GAS • POWER GENERATION

PROJECT DESCRIPTION

Confidential Client

Confidential Location

FLAC3D™ 7.0

The aim of this R&D project is the development of guidelines for the estimation of the water-conducting crack propagation above mined-out spaces above a potash deposit, using research and numerical modelling methods. The propagation of cracks, in the form of the DZ (excavation damage zone) is especially to be investigated depending on the depth and longwall heights, lengths and depth of propagation.

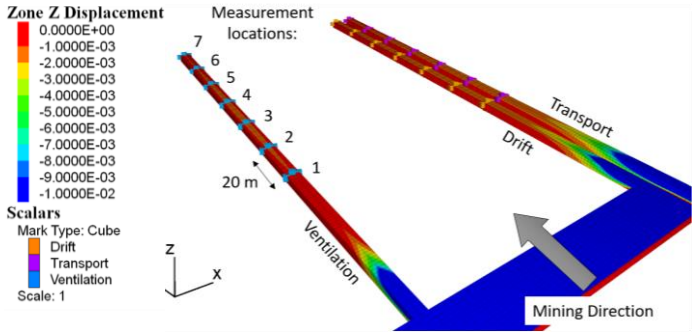

Figure 1. Measurement locations in the numerical model.

ITASCA'S ROLL

The objective was achieved through analyzing the available knowledge attained in the coal-mining industry, through rock mechanical modelling using ITASCA's software package *FLAC3D* Version 7.0. Several different models, with varying levels of complexity have been created and used for the numerical modeling. Furthermore, a new constitutive model, creepIMASS, as a combination of the IMASS and Burgers constitutive model was developed and applied.

PROJECT RESULTS

The results of e.g., subsidence data were compared to in-situ measurements and showed acceptable accuracy. The different models have been evaluated using various methods. The horizontal and vertical convergences in the numerical model were measured in the transport, drift and ventilation track (Figure 1). The influence of the longwall length, height, and depth on the propagation of the EDZ was investigated by the simulation of different longwall dimensions using Model-A. Previously, the extension of the EDZ was determined by the total effective plastic strains and the failure states according to Mohr-Coulomb.

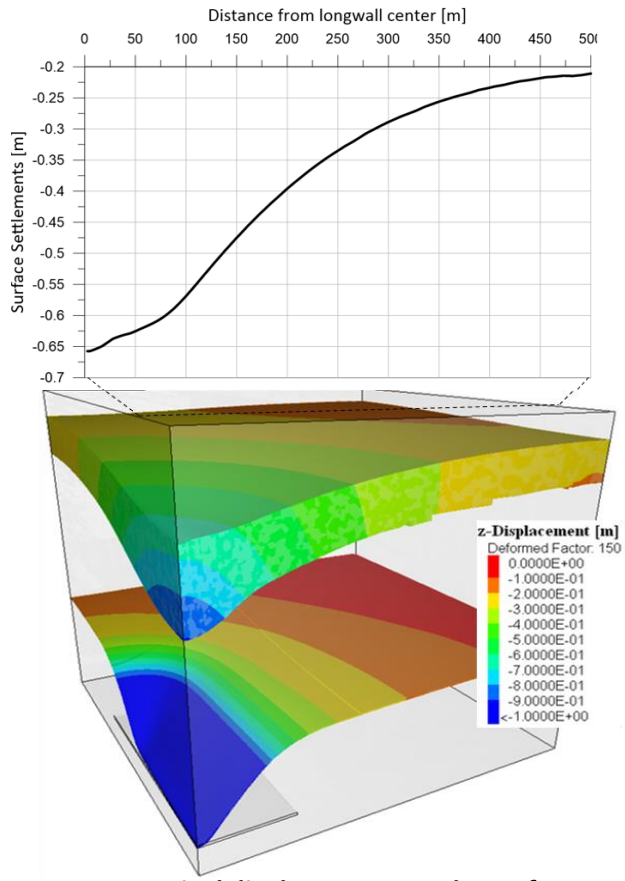

Figure 2. Top: Vertical displacements at the surface. Bottom: Vertical displacements for the surface and 305 m depth.

ICGmbH21-CST-Min-2029

Itasca Consultants GmbH
Leithestraße 111a
D-45886 Gelsenkirchen I +49 (209) 1475630 I info@itasca.de

www.itascainternational.com
www.itasca.de