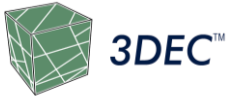


## PROJECT DESCRIPTION

SKB, Posiva & NWMO

Stockholm, Sweden



The main objective of the project was the estimation, via numerical modelling, of the displacement induced in fractures by the excavation of de-stressing slots at the Äspö Hard Rock Laboratory.

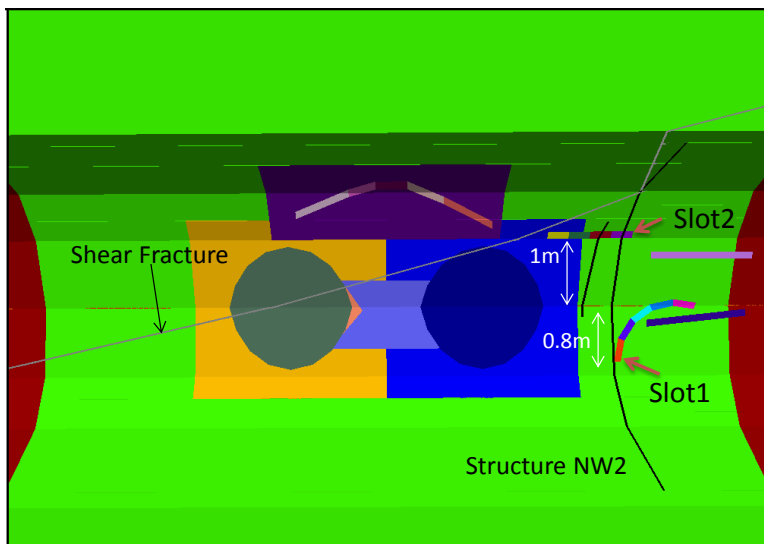
## ITASCA'S ROLE

Itasca carried out numerical analysis for this project divided into three phases. Different geometry of the de-stressing slot/slots was analyzed, as well as: (i) explicit consideration in the model of a shear zone and a small fracture present in the study area, (ii) the persistence of a specific fracture, and (iii) the constitutive model used for the fractures in the model, in the different phases of the project.

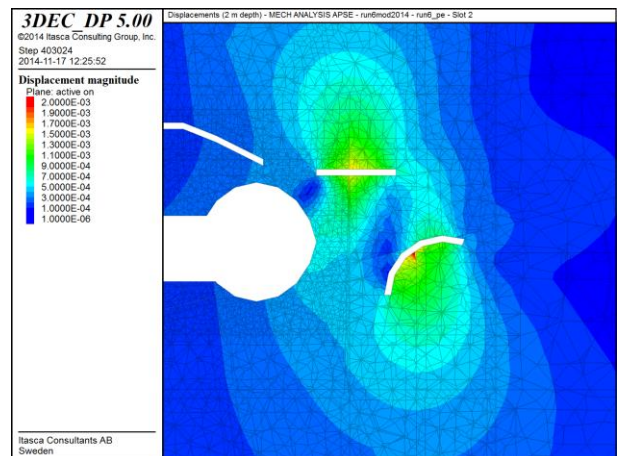
## PROJECT RESULTS

Several simulations were performed in 3DEC with different *in situ* rock stress, different layouts of the de-stressing slots and different constitutive models for the fractures and its persistence. The results showed that the shear displacement induced by the excavation of the slots should be expected to be within the approximate range of 1 mm to 3 mm.

Another important finding in this project was that relatively small differences occurred when using different disposition of slots. The differences using different material parameters were also negligible, taking into account the uncertainty present in the input data. In general, larger shear displacements occurred when using the Mohr-Coulomb joint constitutive model than when using the Continuously Yielding joint constitutive model.



3DEC model geometry: horizontal cut of the tunnel floor



Measured displacements at 2 meters depth under the tunnel floor after the excavation of the de-stressing slots