

## ANALYSIS OF THE STABILITY CONDITIONS OF BEARING BEAMS FOR TRAVELLING CRANES IN THE REVIN CAVERN

**Purpose(s):** To evaluate how anchor failure could compromise the stability of the beams supporting an overhead travelling crane.

**Client:** EDF (French Electricity Authority)

**Date:** 2008

**Location:** Revin (France)

**Partners:** None

**Project executive manager:**  
Daniel BILLAUX

**Code(s) used:** FLAC3D

The cavern was built more than 30 years ago in a schistose rock. This **large excavation** (25 m by 114 m by 32 m) houses 200 MW reversible generators for electricity supply. The beams supporting the overhead travelling crane are maintained by anchors, **whose integrity is unknown and which cannot be monitored**. In advance of crucial jacking maneuvers, EDF asked ITASCA Consultants SAS to evaluate how a rupture, or loss of tension, in these anchors could compromise the stability of the beams.

The model takes into account a simplified **phasing of cavern excavation** and tensioning of the anchors, and considers several **hypotheses for partial loss of tension or anchor failure**. The behavior of the soil, whose mechanical properties depend on the **orientation of the loading with regard to the schistosity**, is modeled with both **anisotropic and "ubiquitous joint" models** to determine the impact of the rheological model on the results.

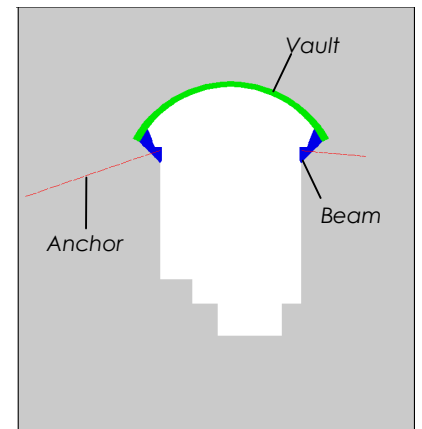


Figure 1 : Cross-section of the cavern model.

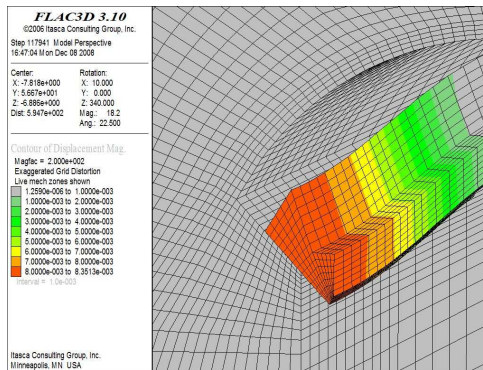


Figure 2 : Magnified beam displacements (factor 200) after loading.

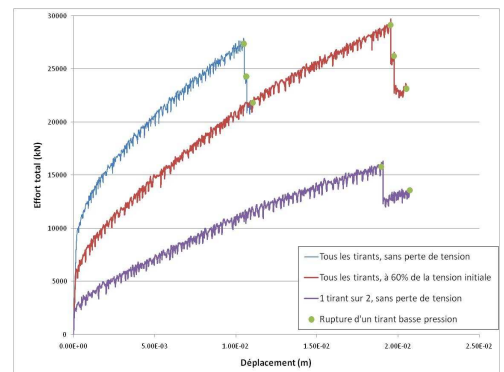


Figure 3 : Results of a beam loading test.

**KEYWORDS:**

- Underground excavation
- Anisotropic model
- Ubiquitous joint model
- anchors

⇒ **RESULTS:**

- Given the strength of the rock mass, the **local interaction** between the beam and the rock is the key to stability.
- This interaction is considered **frictional only**, and, thus, is influenced strongly by the **normal stress**, mainly due to the tension in the anchors.
- For the properties provided by EdF, the various simulations show a **high security margin** against failure or excessive beam movement in all cases considered.