Dr. M. Ugur Ozbay

- Professor, Mining Engineering Department, Colorado School of Mines

- Previous to CSM:
  Professor and Anglo American Chair of Rock Mechanics, University of the Witwatersrand, Johannesburg, South Africa

- Consulting experience:
  Rock mechanics consultancy services to underground and open pit mines in the Americas and South Africa

- Degrees:
  PhD, MSc, and BSc in Mining Engineering

M. Ugur Ozbay: Teaching and Research

Academic Activities:

- CSM Courses (in past 5 years):
  - MNGN 321 "Introduction to Rock Mechanics"
  - MNGN 545/445 "Rock Slope Engineering"
  - MNGN 508 /418" Advanced Rock Mechanics"
  - MNGN 598 "Coal Mining Rock Mechanics"

- Education Innovation:
  - Introduced three new courses: Rock Slope Engineering, Advanced Rock Mechanics, Coal Mining Rock Mechanics.
  - Acquired and implemented numerous rock engineering software for use by undergraduates, graduates, and faculty.
  - Further developed the rock mechanics laboratories to include new tests and introduced a new set of laboratory course notes.
  - Introduced scanline, window mapping, and RQD measurements for use in MNGN321 and 545.
  - Established student exchange programs between five mining engineering departments from five major mining countries.

Research Activities:

- Rockburst mechanisms and modeling for deep mines and tunnels

- Slope stability analyses in large open pit mines

- Yielding support systems for underground mines

- Pillar design in hard rock and coal mines

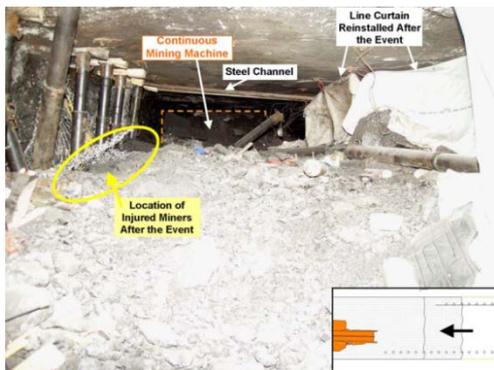- Probability and risk-based designs for pit slopes and mine pillars

M. Ugur Ozbay: Current Research Projects

- Numerical Modeling Methodologies for Assessing Burst Potential in Coal Mines
  - Funded by: Alpha foundation for Improvement of Mine Safety and Health
  - PI: Dr. M. Ugur Ozbay
- Stability Considerations in Deep Open Pit Slopes
  - Funded by (partially): Newmont Mining Company
  - PI: Dr. M. Ugur Ozbay
- Evaluating the Effect of Earthquakes on Open Pit Mines Using Discrete Element Method
  - Funded by: Currently not funded
- Significance of Geomechanical Parameters in Stability of Long-life Coal Mine Openings in Weak Strata Settings
  - Funded by: Currently not funded

Numerical Modeling Methodologies for Assessing Rockburst Potential in Deep Mines

Project Objectives:

- Develop numerical modeling methodologies for assessing bump potential in coal mines.

- Use as a methodology for assessing coal bumps through calculations of available excess energy using explicit numerical models.

Funded by: Alpha Foundation

Funded Period: 10/2013-10/2015

Principal Investigator: Dr. Ugur Ozbay

Vertical cross section of the numerical model

Pillar   Entry

Excess strain energy from pillar mining for different failure criteria

One of more than fifty entries that filled up 80 percent by rubblized coal material from bursting pillars

Rock failures around underground excavations may occur stably or unstably. At depth, unstable pillar failures may manifest violently during the release of elastic energy in the rock. Such events, called rockbursts (aka bumps) occur relatively less frequently but carry high risk for worker safety. The figure on the left shows a coal mine entry after a 3.9 Richter bump event that occurred in a deep coal mine. The figure on the right shows possible excess energy magnitudes as predicted from numerical modeling.
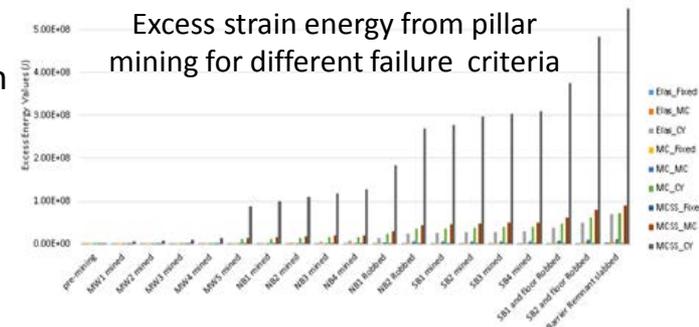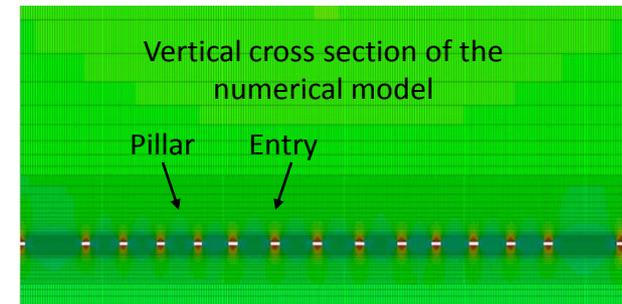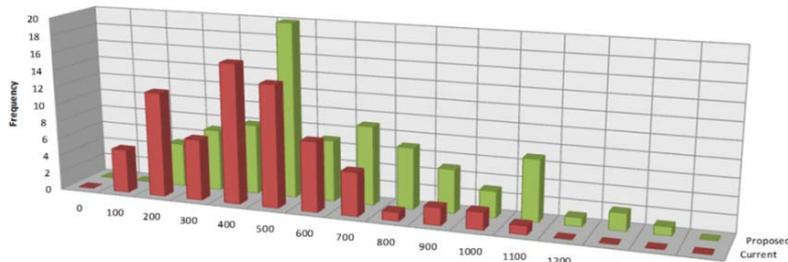
Large Open Pit Initiative

Project objectives:

- Develop a better understanding of the behavior of deep open pits.

- Design rationally-based deep pit slopes.

Current and potential future open pit depths (Robotham 2011)

Limited experience exists with the design and management of large open pit slopes. While pit slope heights in excess of 1000 m are currently being designed, there is very little information available on the behavior of rock slopes at such depths. Although not experienced yet, the potential for a large failure through the slope's toe (see insert on right) needs to be investigated.
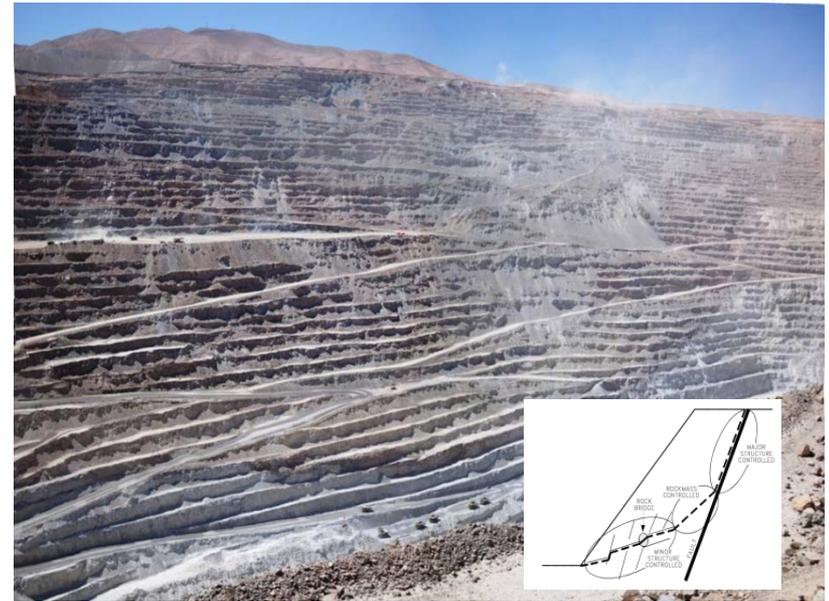
Funded by:
Newmont Mining
Funded Period: 01/2012-12/2013
Principal Investigator:
Dr. Ugur Ozbay

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PhD Projects with Funding Potential

Project: Develop roof support designs for coal mine intersections in very weak roof rock conditions

PhD Candidate: Collin Stewart

Roof failure at an intersection in very weak roof rock conditions

Project: Effect of Earthquakes on Open-Pit Mines Using DEM Approach

PhD Candidate: Amin Azhari

An open pit mine potentially subject to earthquake damage in a seismicaly active region