

Geomechanics & Scientific Visualization

Expertise Geomechanics, Rock Mechanics, Scientific Visualization / Data Integration, Numerical Modeling, Rock Mass Characterization, Photogrammetric Mapping, 3D Geological Deposit Modeling, Integrated Software Tool Development

Education Bachelor of Applied Science, Civil Engineering
University of Ottawa, 1997
Master of Engineering, Mineral Resources Engineering, Laurentian University, 2011

Professional Experience

2005 – Present *Itasca Consulting Canada Inc., Sudbury, Ontario, Canada*
Senior Geomechanics Engineer
Laurentian University, Sudbury, Ontario, Canada
Mining Innovation Rehabilitation & Applied Research Corporation/Geomechanics Research Centre
2002 – 2005 *Project Leader, Advanced Engineering & Scientific Visualization*
1998 – 2002 *Research Engineer*
1995 – 1997 *Geomechanics Research Centre, Research Assistant (summer student)*

Project Experience**Geomechanics Design for Mine Evaluation**

Experienced in many aspects of geomechanics design for mine evaluation studies (scoping through execution), covering a wide range of mineral deposits for both Greenfield and Brownfield projects. Geomechanics mine design experience: collection, analysis and interpretation of site characterization data, integration and analysis of multi-disciplinary datasets (geological, mine planning/production, geomechanical), sequence evaluation and optimization, stope and crown pillar design, numerical modeling, model calibration, and trade-off studies/mining method evaluation etc.

Scientific Visualization and Data Integration

Experienced in developing scientific visualization strategies for the mining and geoscience fields mainly through expert use of the Gocad™ software platform. Custom tool and methodology development based on project need, helping to make better and more informed decisions by visualizing all available information in meaningful ways.

Visualization for Mine Design and Mine Planning: Development of tools and methodologies to aid in the planning of deep underground excavations. The process involves complex three-dimensional data integration utilizing information from exploration drilling (geology and rock mass characteristics), engineering (excavation placement and geometry, in-situ and induced stress), operations (excavation scheduling) and geomechanical criteria. The process allows mine design teams to make better informed decisions while minimizing risk.

Deep Geologic Repository (DGR) Site Investigation: Development of tools and methodologies to aid in the interpretation of various geoscientific datasets, including field measurements and test results, 3D geological models, excavations, numerical simulation results and the evolution of 5D data (X,Y,Z, time, property). Development of tools/methodologies to demonstrate the effects of 3D stress field on permeability anisotropy in moderately fractured rock, for use during the siting process in the advent of moving forward with a DGR concept for isolating spent nuclear fuel in the Canadian Shield.

Visualization for Hazard Assessment and/or Model Calibration: Development of 3D modeling, data integration, property modeling techniques and advanced 3D GIS queries to demonstrate spatial relationships, e.g., microseismic analysis, 3D property modeling of rock mass characterization data, surface subsidence analysis and measurements. Such datasets may be used to help validate/calibrate numerical models.

3D Geological Framework and Deposit Models

Experienced in the development of 3D Geological models using the Gocad™ software platform. Developed regional scale 3D Geological Framework Model to support Deep Geologic Repository program in Southern Ontario. Also, coordinated a major initiative to develop twenty 3D-geological deposit models scattered throughout the Abitibi Greenstone Belt of Northern Ontario. The project aim was to stimulate the discovery of new mineral wealth to maintain and increase mineral investment in the Abitibi region by enabling prospectors, junior exploration companies and major mining companies to benefit from 3D visualization of complex deposit models created by integrating historical and contemporary datasets.

Field & Laboratory Experience

Rock Mass Characterization: On-site field investigations to collect geotechnical parameters using most widely used classification systems (Q, RMR, GSI) from rock core, pit walls and underground excavations. Extensive use of ShapeMetrix3D™, a non-contact photogrammetric joint-mapping system (surface and underground) for identifying relevant joint sets, spacing, etc. in rock.

Lab Testing: Performed various types of testing and analysis to obtain properties of different rock types and/or different shotcrete mix designs.

Research & Development

Ground-Penetrating Radar for Rock Mass Integrity Assessment: Development, calibration and testing of high-frequency Ground Penetrating Radar (GPR), used for detecting tight fractures in tunnel backs.

Virtual Reality Lab, Laurentian University: Development and pioneering use of Virtual Reality technology and Scientific Visualization in the minerals industry for decision-making; assistance to companies in achieving technical milestones using this technology.

Integrated Software Tool Development

- ◆ Involved with the design and development of numerous Gocad™ software modules to aid in the interpretation and analysis of geoscientific datasets (5D sequences, drillhole planning, etc.), to assess tunnel hazards based on integration of stress, geology, mine sequence and geometry.
- ◆ AutoCAD Autolisp & Visual Basic routines for Automated Overbreak/Underbreak Analysis and Computer-Assisted Uphole Deviation Analysis.
- ◆ Stope-Stability Assessment Method (SSAM), Object-oriented web implementation (Java) of a modified Mathews Method with database backend.