

## **General Manager & Principal Geomechanics Engineer**

**Expertise** Geomechanical mine design (surface and underground), rock mechanics, numerical modelling, rock mass characterisation, photogrammetric structural mapping, site investigations, scientific visualisation.

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

**Registration** Registered Professional Engineer in the province of Ontario, Canada

**Honors** Recipient of Itasca International Inc.'s President's Award (2012)

### **Professional Experience**

	<i>Itasca Consulting Canada Inc., Sudbury, Ontario, Canada</i>
2016 – Present	General Manager & Principal Geomechanics Engineer
2013 – 2016	Principal Geomechanics Engineer & Director
2005 – 2013	Senior Geomechanics Engineer
	<i>Laurentian University, Sudbury, Ontario, Canada</i>
2002 – 2005	MIRARCO, Project Leader, Advanced Engineering & Scientific Visualization
1998 – 2002	Geomechanics Research Centre, Research Engineer
1995 – 1997	Geomechanics Research Centre, Research Assistant (summer student)

### **Project Experience**

*Geomechanical Mine Design for Mine Evaluation Studies:* Experienced in many aspects of geomechanics design and has led many geomechanical studies for project evaluation (scoping/pre-feasibility/feasibility/execution), covering a wide range of mineral deposits for both Greenfield and Brownfield sites. Geomechanics mine design experience: collection, analysis and interpretation of site characterisation data, integration and analysis of multi-disciplinary datasets (geological, mine planning/production, geomechanical), trade-off studies/mining method evaluation, empirical geomechanical design, kinematic slope design, caveability assessments, subsidence assessments, numerical modelling and model calibration, open pit design, recovery and dilution assessments, etc.

*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, development of "Block Models" using collected rock mass characterisation data (pits and underground), surface subsidence analysis and measurements, fault-slip potential, etc. Such datasets may be used to help validate/calibrate numerical models and evaluate risk to support decision making.

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.

Data Interpretation & Analysis: 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, maximizing value and 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 and numerical simulation results for the siting process for DGRs located in the Canadian Shield (crystalline) and also in sedimentary basins.

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 the 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 and increase mineral investment.

Rock mass Characterisation: On-site field investigations to collect geotechnical parameters using the most widely used classification systems (Q, RMR, GSI) from rock core, pit walls and underground excavations. Expert user of ShapeMetrix3D™, a non-contact photogrammetric joint mapping system (surface and underground) using terrestrial cameras and drones/UAVs to acquire photographs.

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

Experiment Design: Participated in the design of shotcrete liner adhesion and welded wire mesh pull tests (both field and laboratory settings).

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; providing assistance to companies in achieving technical milestones using this technology.

Mining Automation Program, INCO Ltd. (175 orebody Copper Cliff): Evaluated drifting performance of first-generation tele-operated drilling/blasting equipment.

Integrated Software Tool Development: AutoCAD AutoLISP and Visual Basic routines for automated overbreak/underbreak analysis and computer-assisted uphole deviation analysis.