Mikael Svartsjaern– ITASCA Sweden

Senior Engineer

Expertise Rock Mechanics, Numerical modelling, Mining Engineering

Education

Ph.D. (Mining and Rock engineering), 2017
Luleå University of Technology, Luleå, Sweden

Licentiate in Engineering (Mining and Rock engineering), 2015
Luleå University of Technology, Luleå,

M.Sc (Civil Engineering), 2011
Luleå University of Technology, Luleå,

Professional Affiliations ISRM member

Professional Experience

2024 – present	*Itasca Consultants AB, Luleå, Sweden* *Senior Engineer* *Strategic Technical Officer*
2023 – 2024	*Sweco Sweden AB, Luleå, Sweden* *Specialist Rock Mechanics*
2018 – 2023	*Itasca Consultants AB, Luleå, Sweden* *Geomechanical Engineer / Senior Engineer*
2011 – 2017	*Luleå University of Technology, Luleå, Sweden* *Research Engineer / Ph.D. Student*
2010	*Boliden AB, Kristineberg mine,* *Mining engineer, vacation substitute*
2009	*Boliden AB, Kristineberg mine* *7-month internship*

Project Experience

Civil engineering
Effective stress analysis with focus on effects from 3D inclination variations of the rock foundation for the Sourva hydro power dam. Analysis conducted in Plaxis 3D as coupled steady-state follow-deformation models.

Project planning documents on rock support and stability for Fridhemplans subway station. Included supported numerical models in Plaxis 3D.

Rock mechanical support during design and construction of Rönnskär repository including review and cumulation of geomechanical data for the Boliden underground repository at Rönnskär.

Evaluation of modelling results from FLAC3D and 3DEC for Boliden's underground repository at Rönnskär intended for storing hazardous material. The repository life-span is expected to be 3000 years, analyses included long term stability and rock mechanical effects on flow paths.

Project lead for modelling and rock mechanical analysis of Västlänken underground tunnel crossings involving low rock cover and sensitive facilities. Analyses included supported continuum models (FLAC3D) and dynamic discontinuum models (3DEC) for evaluation of impact from explosion loads.

Modelling of a new (future) complex tunnel intersection at Västlänken in close proximity to existing underground open rooms. Models included plastic materials and support elements (shotcrete and bolts) in FLAC3D and Pile loads in 3DEC. Deliveries included recommendations on support options, monitoring program for the construction and stability analyses.

Rock mechanical modelling support (FLAC3D) in a project on Stockholm subway extension involving unfavorable rock conditions.

Member of work group for IEG 2.0 focus on calculation models/methods.

Co-author on a method description on back analysis of in situ stress field from convergence measurements for SKB. Co-author on method description on rock mechanical mapping procedures for SKB.

Design support & follow-up during construction for several tunnel crossings at Västlänken.

Preliminary design recommendations for long term geomechanical monitoring at SKB spent nuclear storage.

Support on rock mechanical analyses for lined-cavern pilot hydrogen gas storage.

Pre-design rock mechanical work on crossing between Västlänken and Götatunneln.

Project lead on geotechnical (field mapping) at Rengård power station.

Geomechanical core mapping in various projects.

Mining
Coordination of international work team for a dynamic stability study of the Malmberget Tailings dam including project economy, client meetings, internal project management and technical review of final report.

Ground vibration prognosis for underground and surface mining at the Sakatti mine site.

Analysis of alternative resumption options for the Kiirunavaara mine after a significant mining induced seismic event including determination of safe dimensions for the final Kiruna mine barrier pillar.

Project lead on seismic response prognosis and rock mechanical analysis of past and future mining of the Hoppet orebody, Malmberget mine.

Definition of infrastructure restriction volumes for the Malmberget mine based on mine scale caving models. Analysis of effect of alternative mining rates and seismic response at the Malmberget and Kiruna mines.

Mine-scale modelling of impact from alternate production sequencing at the Kiirunavaara mine using hybrid-mesh models in FLAC3D. Caveability study of remnant SLC pillar at the Kiirunavaara mine using coupled (FLAC3D-CAVESIM) model.

Setting-up, running and analyzing Caving-model (FLAC3D-CAVESIM) for Kiirunavaara with focus on evaluating ground surface impact on the hangingwall. Follow up project comparing different ground surface response to different caving methods.

Development and interpretation of conceptual models for large scale damage evolution in the Kiirunavaara mine footwall using UDEC. The models were used as basis for the design of a monitoring system for large scale underground movement.

Development and interpretation of damage accumulation models for the Kiirunavaara mine footwall in PFC. The models were used to understand the progression of infrastructure damage and used to support the design of damage extent nomograms for future mining steps.

2nd opinion on design of Norwegian open stoping operation including evaluation of input data, design methodology and design recommendations.

Geotechnical characterization and design recommendations for large scale stoping at the Björkdal mine.
Rock mechanical support for operation rock mechanics at the Björkdal mine 2021-2022 and ongoing starting 2024.

Rock mechanical support for operation rock mechanics at the Fädbodliden mine ongoing starting 2024.

Comprehensive underground damage mapping including design of mapping plan, mechanism analysis in-situ, large scale pattern analysis, and documentation procedures for the Kiirunavaara mine.

Supported work on design recommendations for the Boliden Rävliden deposit.

Geotechnical characterization and ground support design recommendations for future underground crusher facility at the Aitik open pit.

Design and installation of a monitoring system for large scale rock mass displacement constituting TDR (shear)-cables, hole extensometers and tape-extensometers. Design of a prediction tool for damaged zone extent in the Kiirunavaara mine footwall for future mining steps including development procedures and validation.

Over-break and charging procedure follow-up. Support and reinforcement quality assessment. Operation of filling station for cut-and-fill operations at the Kristineberg mine.

Teaching
1st cycle courses in fundamentals and introduction to rock mechanics at Luleå University of Technology including pre-investigations, stresses, deformation, rock strength and failure criteria, cavern stability and slope stability. Main teacher at field excursion involving mapping of joint geomechanical properties and in situ orientation estimation.

2nd cycle courses in design of rock constructions and applied rock mechanics at Luleå University of Technology including plasticity and yield criteria, post yield behavior and numerical modelling basics. Excursion leader for field work at active mine sites including preparational lectures, field visit and post field analysis supervisor.

Course lecturer for introductory course in FLAC3D for mining and civil applications at TEKNA Kursdagene, Trondheim, 9–10 Jan 2019.

Master thesis supervision:
Mattsson, L. 2022. Stress dependent flow behavior in sublevel caving mines, KTH