Axel Bolin – ITASCA Sweden

Senior Rock Mechanical Engineer

Expertise	Rock Mechanics, Tunnel Engineering, Numerical Modeling
Education	M.Sc. Civil Engineering (Infrastructure), 2008 KTH Royal Institute of Technology, Stockholm, Sweden
	Universidad Politécnica de Catalunya (UPC), 2007 – 2008. Erasmus scholarship during 4th year in Barcelona. Courses mainly in geotechnical and rock mechanical engineering, all in Spanish.
Professional Affiliations	Svenska Bergteknikföreningen International Society of Rock Mechanics (ISRM)

Professional Experience

2025 – *Present*	Itasca Consultants AB, Stockholm, Sweden Senior Rock Mechanical Engineer, consultant
2022 – *2025*	Trafikverket Investering, Stockholm, Sweden Technical specialist in rock mechanics and responsible for construction review at the Södertörn Crosslink.
2018 – 2021	Trafikverket Stora projekt, Stockholm, Sweden Technical specialist in rock mechanics and responsible for construction review at the Stockholm Bypass and the Mälaren Line project
2012 – 2018	Itasca Consultants AB, Stockholm, Sweden Geomechanical Engineer, Consultant
2009 – 2012	Geosigma AB, Stockholm, Sweden Rock Mechanics Engineer, Consultant

Project Experience

Specialist in rock mechanical engineering at the Swedish Transport Administration. The role has included review and responsibility for construction review of technical documents within rock engineering. In addition, worked continuously supporting the project with expertise related to rock design documents, design and cost optimizations, work with exemption from design regulations, production issues, etc., for the projects Stockholm Bypass (2018-2020), the Mälar Link (2019-2020), the train tunnel at Hallsberg-Stenkumla (2024-2025) and the Södertörn Crosslink (2021-2025).

Project manager and coordinator for the work with regulations and advisory documents at the Swedish Transport Administration. Responsible for coordinating technical specialists and consultants in developing the requirements of Krav Tunnelbyggande ver 2.0 (TRVINFRA-00233) and reach the point of publicizing, coordinated with writing, reviewing and publicizing the updated advisory document *Projektering av bergkonstruktioner* ("The Rock Design Handbook") as well as the new advisory document *Explosionslaster i tunnlar – en vägledning*.

Served in the reference group and as a reviewer for several research projects at the Swedish Rock Engineering Association (BeFo). The research has primarily been conducted within numerical modeling and analysis, as well as the shear resistance of rock fractures. For a period, also worked in the field with so-called Tunnel Seismic Prediction (TSP), where equipment purchased by the Swedish Transport Administration used seismic waves to predict the quality of the rock mass in front of the tunnel face.

Rock Mechanics at Itasca until 2018. Worked on design documents for the intersection between the new Akalla – Barkarby metro line and the tunnels for the Stockholm Bypass. In the work, a three-dimensional analysis with *FLAC3D* was constructed, in addition to the work of developing material parameters and other design documents.

Dynamic analyses with the calculation programs *FLAC3D* and *3DEC* in two separate projects, both with the intention of investigating the impact of earthquakes on different types of nuclear fuel storage facilities. Both projects included responsibility for project management, time and cost monitoring, etc.

Analyses of tunnel geometries and their impact on spalling for several proposed design solutions for SKB's final repository. The analyses were performed in *FLAC* and primarily studied the impact of how different cross-sections and initial stresses in the rock mass affect the risk of spalling in the tunnels.

Simulation of pull-out tests with *FLAC*. Calibration against real pull-out tests was done as part of a research project with the so-called Cavimeter. The equipment should be able to measure how well-embedded rock bolts are, which was tested on a number of bolts with a predetermined grouting quality.

Core mapping at, among others, LKAB in Malmberget/Gällivare with the *RMR* and *Q*-system and also RQD mapping through borehole filming.

Several calculation simulations with *FLAC*, *UDEC*, *FLAC3D* and *3DEC* have been performed for various mining projects. Slope stability, spalling around shafts, kinematic analyses and extraction sequences are some of the application areas that have been studied.

Rock specialist at Geosigma. Worked with Boltometer tests (non-destructive testing) of grouted rock bolts in the Northern Link and Citylink projects. Tests of rock bolt grouting quality with ultrasound as part of the quality controls on the tunnel reinforcement.

Instrumentation with DIPS, radar and water loss measurements in boreholes at Drottningholm and Kungshatt, as part of the preliminary investigations of the passages under Lake Mälaren for the Stockholm Bypass. Has also participated in water loss measurements at ÄSPÖ, in order to study the transmissivity of the rock. The work was carried out with Geosigma's specially developed equipment HWIC.

Groundwater measurements for the Northern Link and Stockholm Bypass. Measurements of water pipes took place during active tunneling for the Northern Link and as part of the preliminary study for the Stockholm Bypass. Has also measured groundwater during several test pumpings, including at Norra Station as part of the work on the Northern Link, and also during the construction of a new parking garage in Täby Centrum.

Worked for three months as a hired consultant with Quality, Environment and Work Environment Issues (KMA) at the Norrmalm Tunnel (City Line). The work consisted of, among other things, sampling fiber content in shotcrete, checking bolts, water balance in the tunnel, etc.