DigiRock - Development of digital twin for rock drilling

Project leader
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Partners
Epiroc Drilling Tools AB, Boliden Minerals AB,
DYNAmore Nordic AB (ANSYS), Vastec Engineering AB

Project duration
March 2022 – February 2025

SWEDISH MINING INNOVATION

Med stöd från
VINNOVA Sveriges innovationsmyndighet
Energimyndigheten
FORMAS
Strategiska innovationsprogram

Goals of the project

- Optimized drilling process
- Reduce wear on drill bit with maintaned or improved rate of penetration

- Develop a digital twin of drilling process
- Physical models combined with advanced numerical simulations
- Support development of drilling equipment and optimization of drilling process

- Further industrial expertise in software for simulation
- User friendly simulation environments and methods

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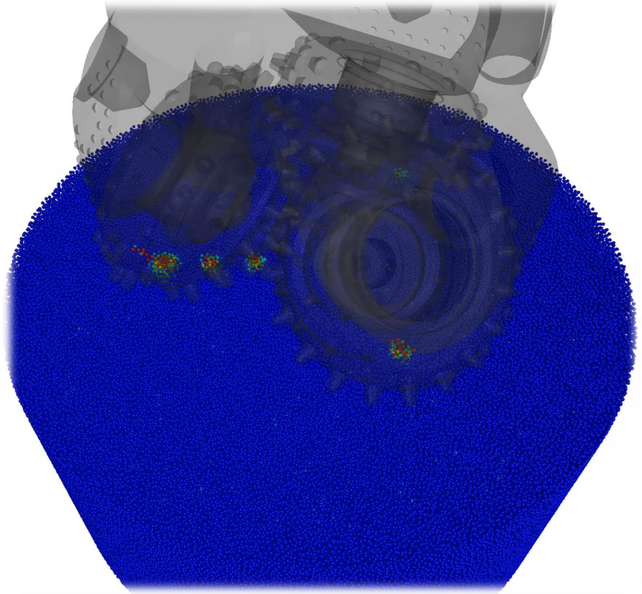
Goals of the project



Laboratory

Digital twin
(lab scale)

Digital twin
(full scale)

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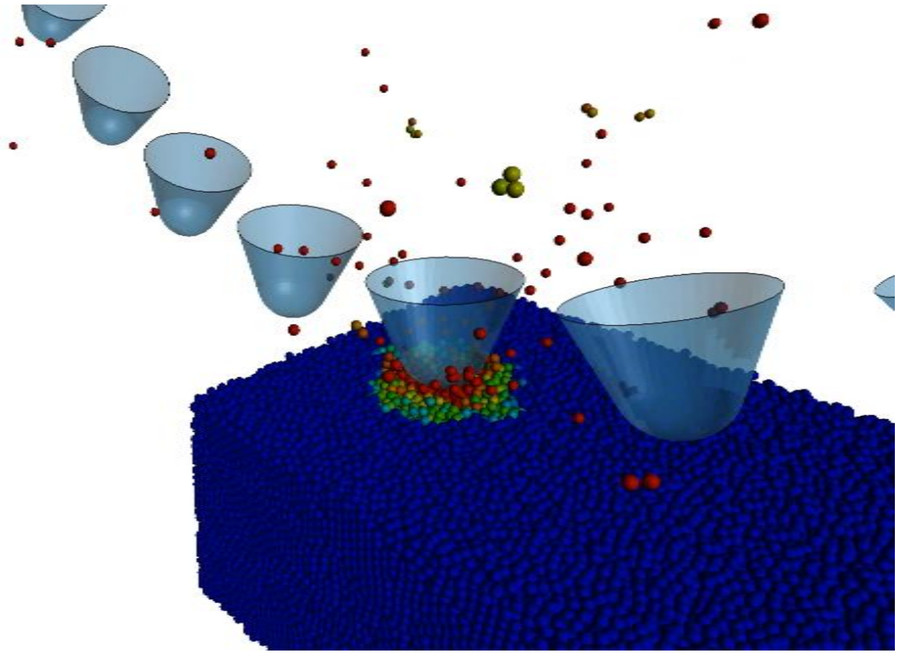
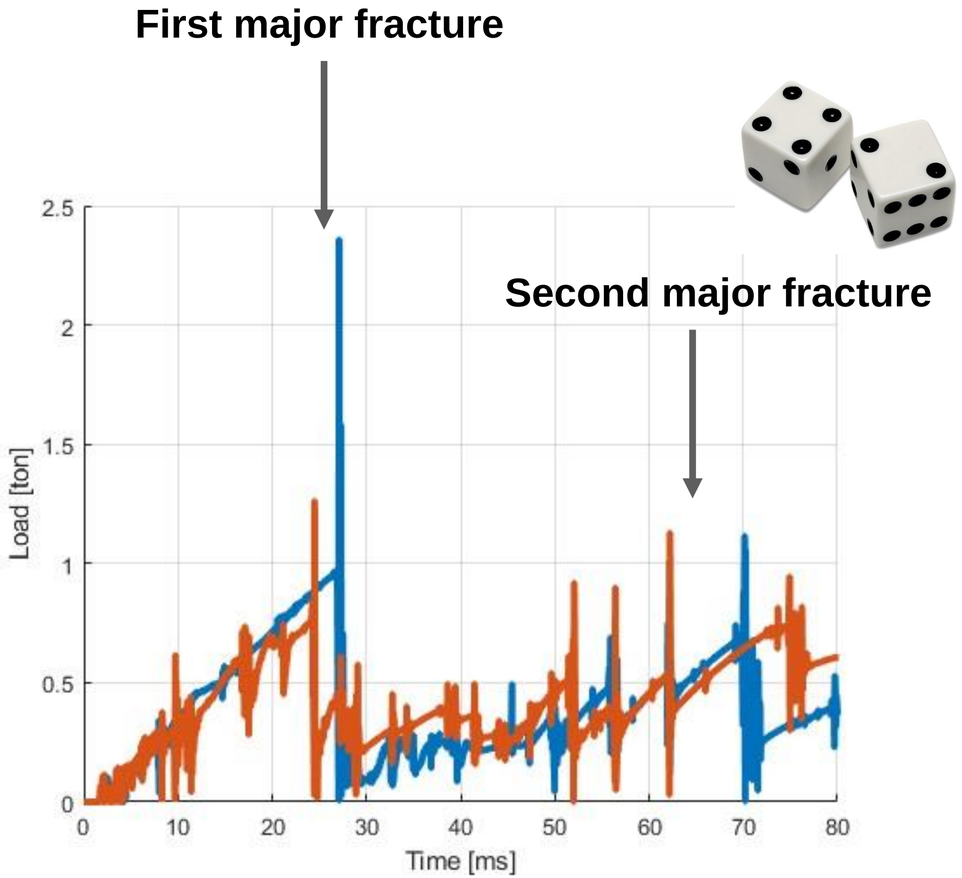
Results so far





Depth-of-cut 4 mm. Peak force varies between 1.2 to 2.0 tons

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Results so far

Paper A

Computational Particle Mechanics (2022) 9:615–631
https://doi.org/10.1007/s40571-021-00434-w

A statistical DEM approach for modelling heterogeneous brittle materials

Albin Wessling[1] · Simon Larsson[1] · Pär Jonsén[1] · Jörgen Kajberg[1]

Received: 28 May 2021 / Revised: 17 August 2021 / Accepted: 19 August 2021 / Published online: 3 September 2021

Paper B

materials

Article

Dynamic Compressive and Tensile Characterisation of Igneous Rocks Using Split-Hopkinson Pressure Bar and Digital Image Correlation

Albin Wessling * and Jörgen Kajberg

Paper C

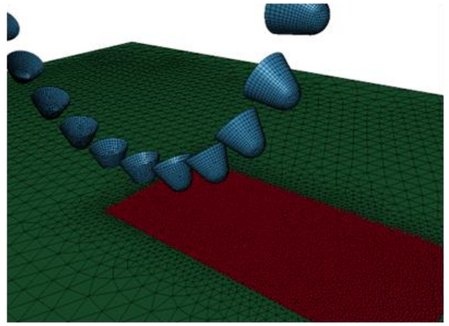
Computational Particle Mechanics
https://doi.org/10.1007/s40571-023-00688-6

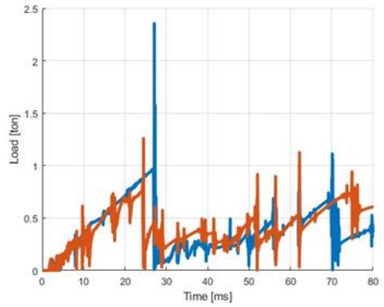
A statistical bonded particle model study on the effects of rock heterogeneity and cement strength on dynamic rock fracture

Albin Wessling[1] · Simon Larsson[1] · Jörgen Kajberg[1]

Received: 2 August 2023 / Revised: 11 October 2023 / Accepted: 27 October 2023

Paper D (under production)





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Upcoming activities and next step

- Simulation driven selection of bit geometry and drilling parameters
- Trial of geometries and parameters in-field (Aitik)

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Mining innovation for a sustainable future

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