

Energy Efficient Comminution: Full Scale Innovation Project

Project leader

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Partners

Boliden Minerals AB

Newmont Technologies Pty Ltd

Fraunhofer-Chalmers Centre

Project duration

01 March 2022 – 30 October 2024



The project background

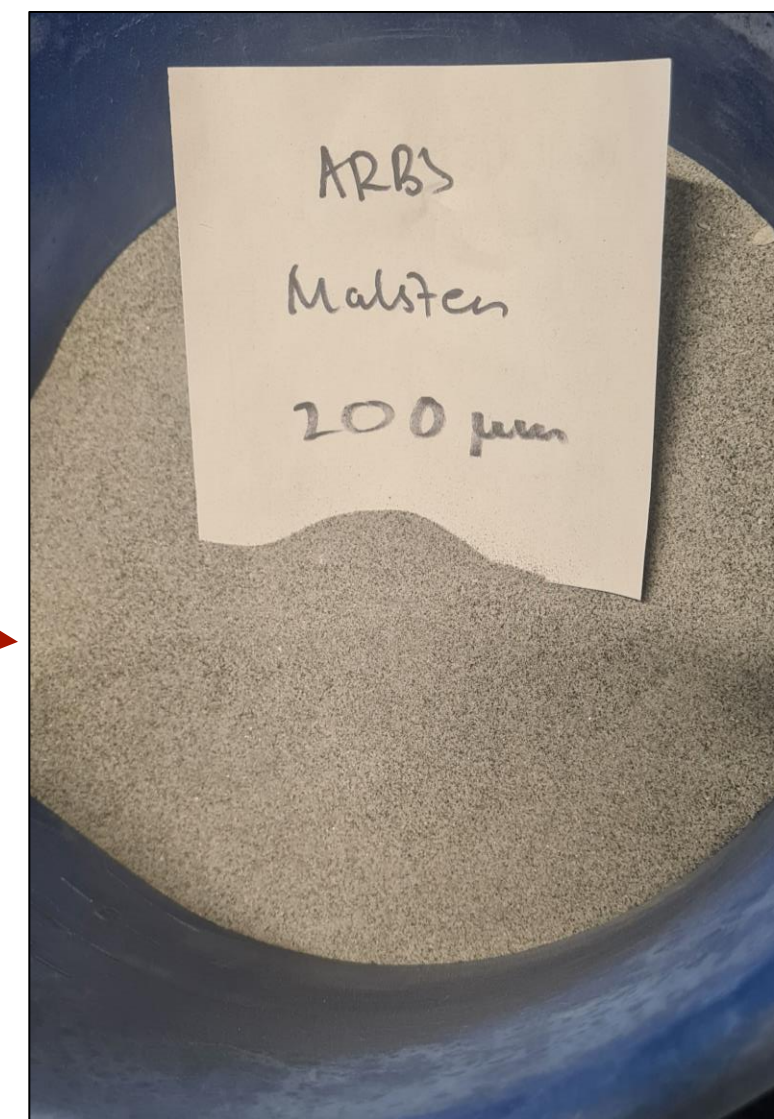
Conventional Milling

- × Energy inefficient
- × Wide product size distribution
- × Large environmental footprint
- × Challenging process control
- ✓ Proven and reliable at very large scale



ARBS Milling

- ✓ Energy efficient
- ✓ Steep product size distribution
- ✓ Smaller environmental footprint
- ✓ Simple, real-time process control
- ✓ Improved coarse mineral recovery
- × Nascent technology, unproven at large scale,



Goals of the project

Core purpose of the project:

Develop the ARBS technology from ‘tested at large scale in the laboratory’ to ‘ready to deploy in a production facility’



1. Project Coordination

2. Pilot execution

3. Recovery – Sweden

4. Recovery – Global

5. DEM feed modelling

6. Other R&D

7. Demo Mill concept design

8. IP protection

9. Market and supplier development

Project deliverables

1. A completed, extensive test and R&D programme to verify the benefits and commercial potential of the ARBS process and equipment, with corresponding technical reports.
2. A completed pilot test programme.
3. A full concept design for a nominal 50 tph demonstration plant.

Project Highlights

1. Formal SMI/ Vinnova project completed on 30 October 2024
2. Pilot mills commissioned by June 2022. Operated, tested and upgraded over 2022, 2023 and 2024
3. Over 500t of various ores processed. Longest continuous run of 7 hours (shift and feed limitations)
4. Low energy use and steep size distributions verified at higher throughput and over continuous runs
5. Mineral recovery at coarse grind superior to conventional technologies on all ores tested
6. Two 'demo mill concept studies' completed (including a mill concept design and estimates of delivered cost, installation and certification requirements)
7. Assessed the technology status against a 'MVP' for early mill segments. Provides 2-3 very clear areas for priority development.
8. Signed 2 formal supplier partnerships agreements to 'industrialize' the technology. Several other long-term collaborations developed during the project
9. One new large global mining company joined to support the project over the next 2-3 years
10. Five related university MSc or PhD projects completed (PhDs still in progress)
11. Two provisional patents developed (at final drafting stage with patent lawyer)

Upcoming activities and next steps

- Another (4th) major global mining company poised to join the project
- Project's focus shifts to full design of at least 2 'demonstration mills' suitable for large scale operation at our Industry Partners' operations:
 - 50 tph mill for specialist applications
 - 100 tph coarse grind demonstration mill for large scale mining
 - Possible 300-500 tph coarse grind mill as first 'commercial' mill
- Our pilot and R&D activities will continue for at least 2 years:
 - Several areas require further development and refinement before we can build large and expensive mills
 - On-going need to demonstrate ARBS performance for prospective partners and customers
 - 2 PhD projects will conduct research on the mill and the further processing of the milled product



Mining innovation for a sustainable future