ATTEST: Grindability test instrument for estimating rock attrition

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Partners
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Project duration
2024-2025

SWEDISH MINING INNOVATION

Med stöd från
VINNOVA Sveriges innovationsmyndighet
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Goals of the project

To develop and assess an innovative test method specifically designed for the evaluation of the grinding response of rock and drill core materials, with a particular emphasis on autogenous grinding processes (including AG mills and pebble mills).

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Background

- Autogenous mill is characterized by being energy-intensive and high throughput while being superior than traditional Rod and Ball milling by eliminating steel charge (e.g. Boliden Aitik Primary mill ~23 MW power, ~1500 t/h)

- Generally, Bond Work Index or Axb value of Drop Weight Test is used, however in case of pebble mill, attrition is more relevant. In Boliden and LKAB (Sweden) grindability is used. The amount (kg) of fines generated per kWh spent.

- The grindability values helps to predict plant throughput and allows for optimum scheduling (resource-efficiency).

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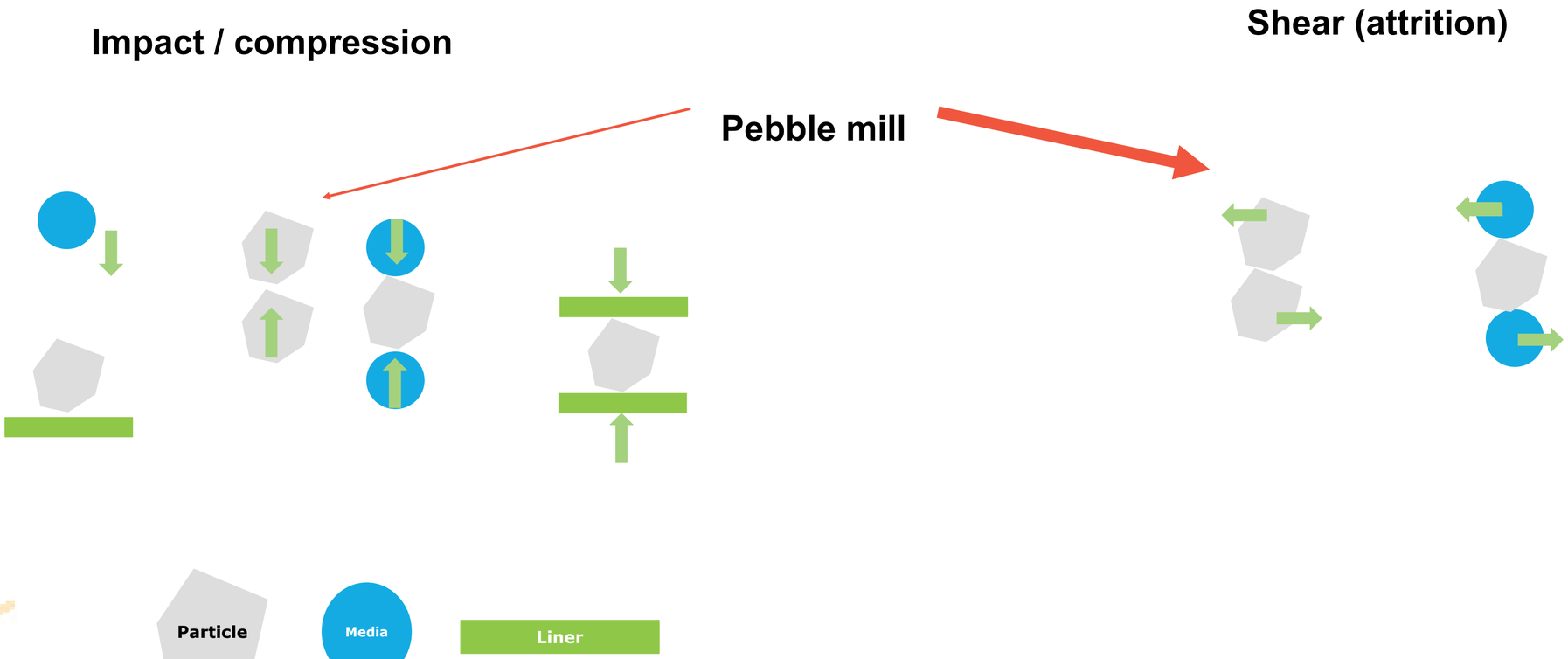
Loading (force) on particles in comminution



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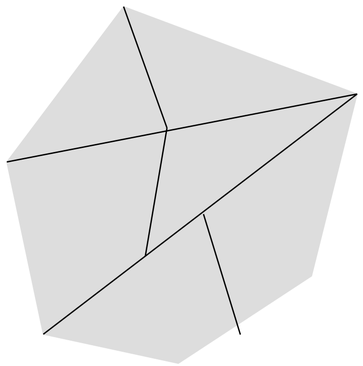
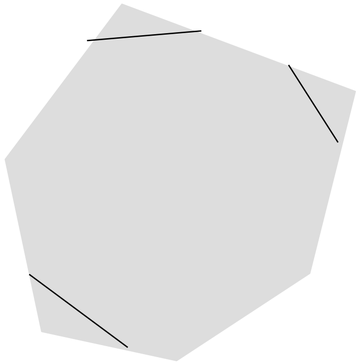
Breakage mechanisms based on particle size

Shattering and cleavage



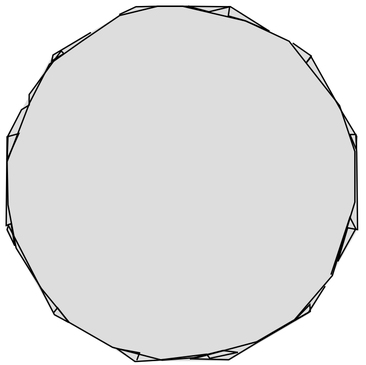
Generates large particles

Chipping



Generates small particles

Abrasion



Generates very fine particles

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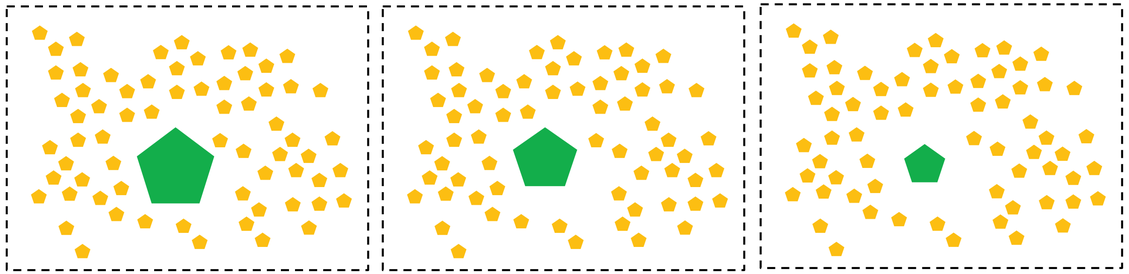
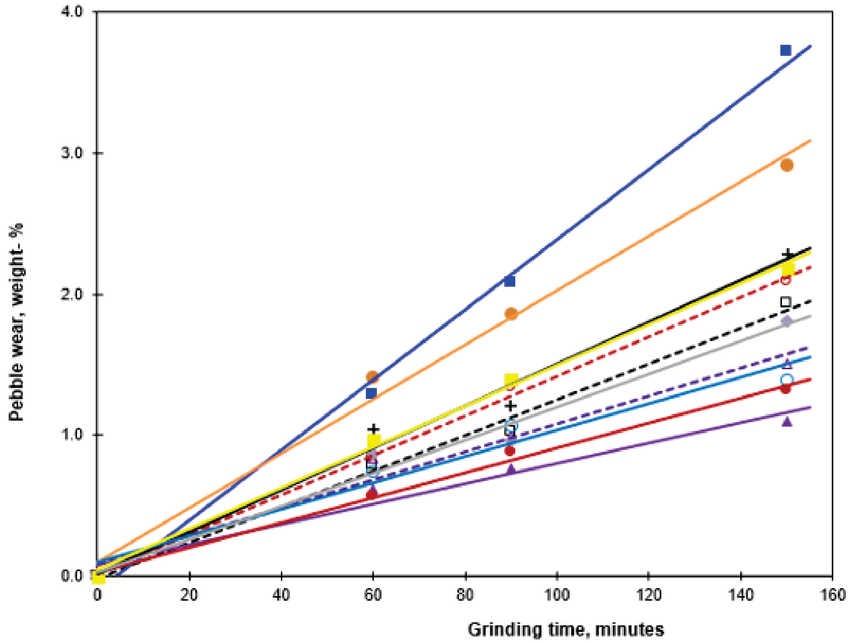
Results so far





Linear mass loss of large particles due to attrition

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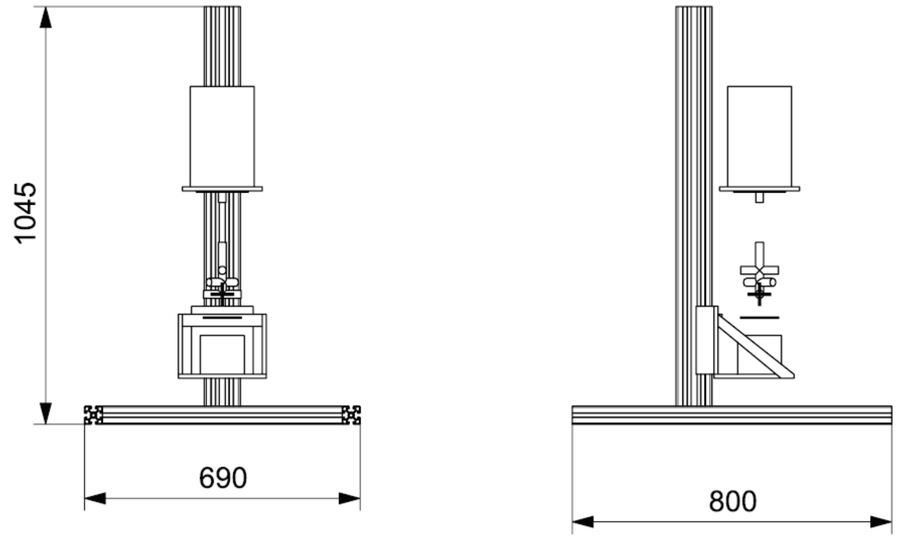
Upcoming activities and next step

- Finalizing and instrumenting the prototype
- Comparative studies with the prototype



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