1. Lithium Ore Feed Characteristics

Spodumene

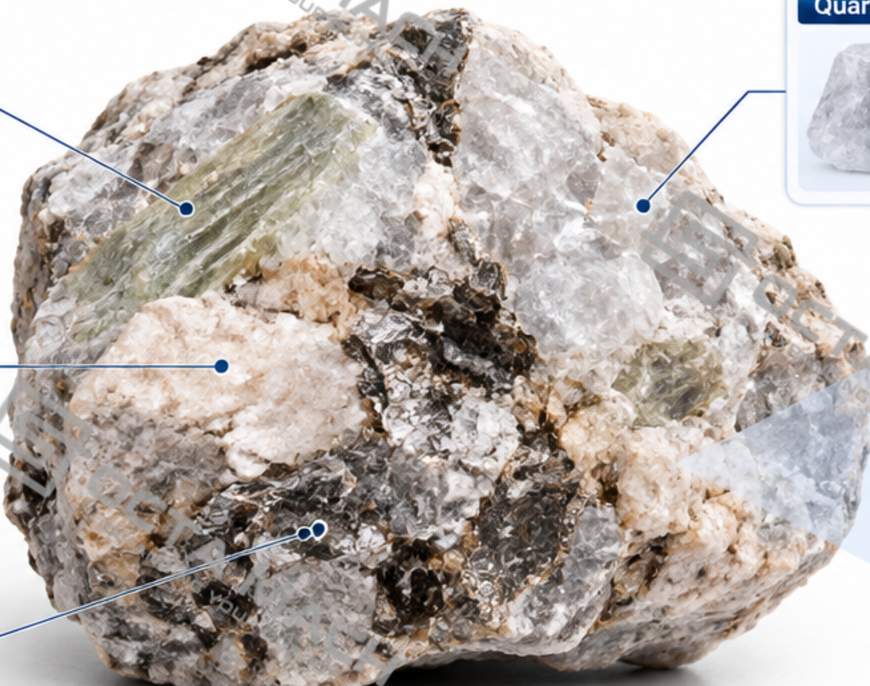
- Formula: $LiAlSi_2O_6$
- Mohs hardness: **6.5 – 7**
- Principal hard-rock lithium mineral

Feldspar

- Mohs hardness: **6 – 6.5**
- Major gangue mineral in pegmatite

Mica / Weathering

- Mica minerals (e.g. muscovite, biotite)
- Softer and flaky
- Can generate fines and affect screening



Quartz

- Formula: SiO_2
- Mohs hardness: **7**
- Increases abrasiveness of the ore

Mineral texture

Spodumene is intergrown with quartz, feldspar and mica in pegmatite.

Whole-Rock Behavior

- ☑ Controlled by the complete rock matrix, not a single mineral
- ☑ Competency varies with mineralogy and structure
- ☑ Quartz-rich gangue increases abrasion potential
- ☑ Natural fractures and weathering influence crushing performance

Typical ROM Size

Approx.

0 – 500 / 600 mm

(project-dependent)

Crusher selection must be based on whole-rock characteristics rather than spodumene hardness alone.

Lithium Ore Crushing and Size Reduction Technical Guide

2. Lithium Ore Particle Size Progression

ROM Ore → **Primary Crushed** → **Secondary / Tertiary Crushed** → **Grinding Feed**

ROM Ore	Primary Crushed	Secondary / Tertiary Crushed	Grinding Feed
approx. 0–500/600 mm	approx. 100–200 mm	approx. 10–40 mm	Project-Specific




Reference engineering ranges, not universal lithium ore specifications.

Actual size targets depend on ROM fragmentation, ore competency, liberation and downstream beneficiation.

Key Influencing Factors

Blast Fragmentation
The size distribution of blasted rock strongly affects crushing performance.

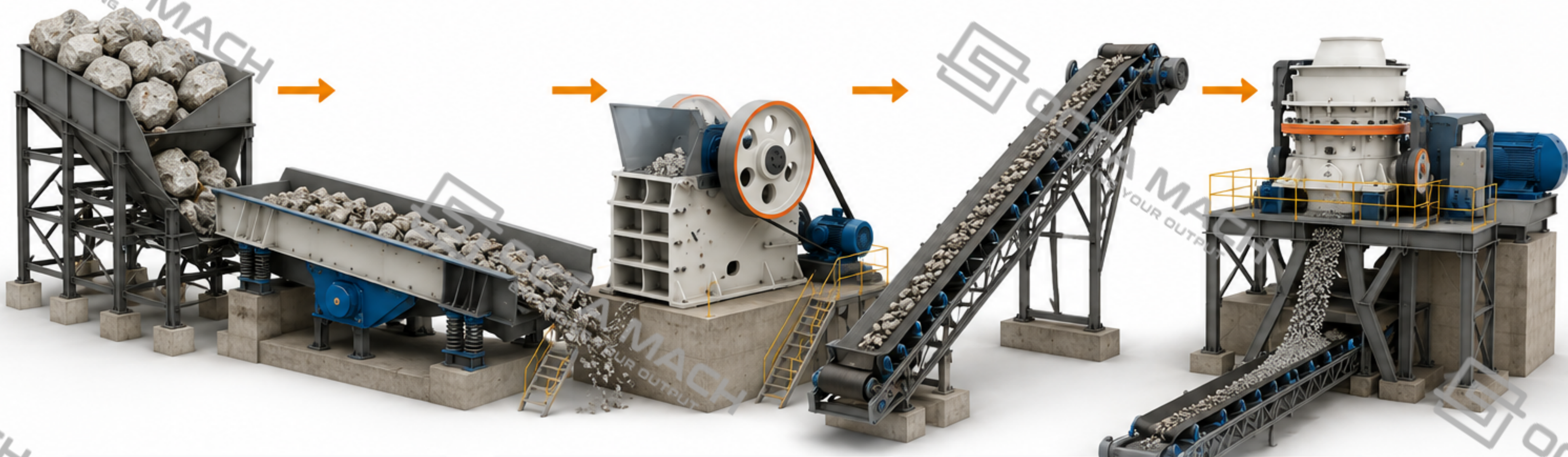
Ore Competency
Harder and more competent ore requires more crushing energy and tighter control.

Downstream Liberation Requirement
Required mineral liberation and selected beneficiation route determine the target grinding feed size.

Lithium Ore Crushing and Size Reduction Technical Guide

3. Primary and Secondary Compression Crushing

ROM Pegmatite → Vibrating Feeder → Jaw Crusher → Intermediate Conveyor → Cone Crusher



Jaw Crusher

Coarse ROM reduction

Designed to handle large lump size and high impact from blasted pegmatite.

Cone Crusher

Secondary compression reduction

Provides continuous crushing action for further size reduction and shape control.

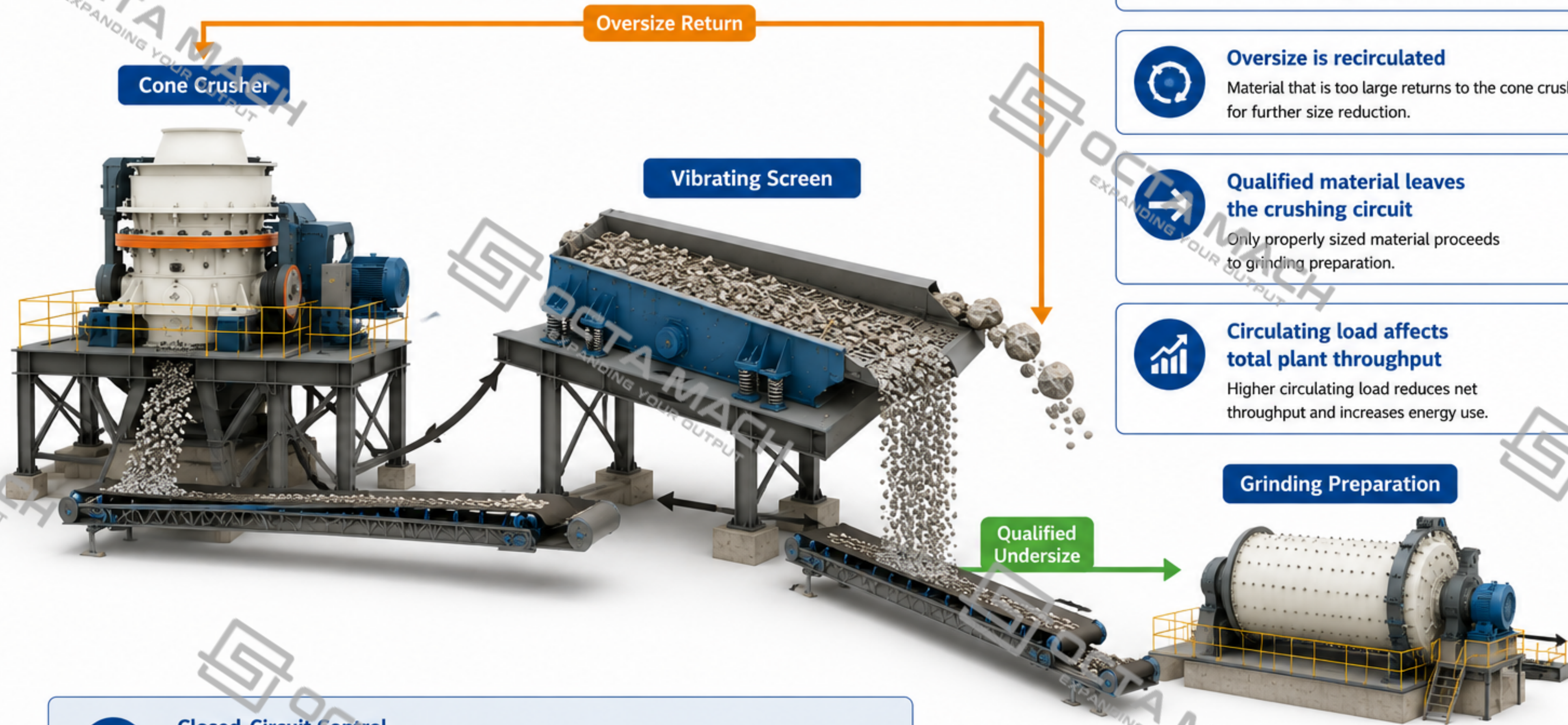
Quartz-rich pegmatite

Abrasive wear must be considered

High quartz and feldspar content increases liner wear and equipment maintenance requirements.

Lithium Ore Crushing and Size Reduction Technical Guide

4. Screening and Closed-Circuit Control



Screen controls mill-feed top size
The screen ensures only material below the set top size leaves the crushing circuit.

Oversize is recirculated
Material that is too large returns to the cone crusher for further size reduction.

Qualified material leaves the crushing circuit
Only properly sized material proceeds to grinding preparation.

Circulating load affects total plant throughput
Higher circulating load reduces net throughput and increases energy use.

Closed-Circuit Control
A properly designed closed-circuit system maintains a stable feed size to the grinding circuit, protects the mill from oversize, and optimizes overall plant efficiency.

Lithium Ore Crushing and Size Reduction Technical Guide

5. Preparing Lithium Ore for Grinding

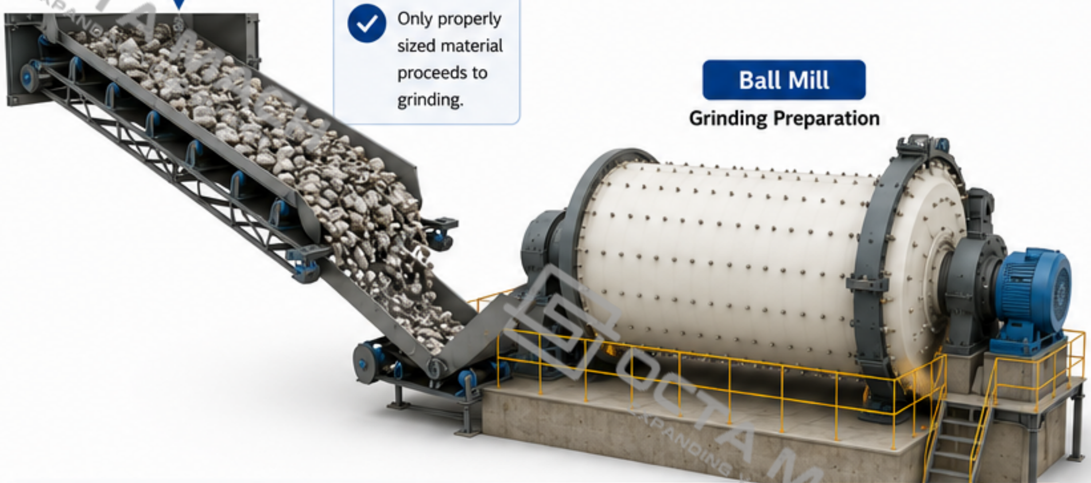
From Screening

Qualified Undersize

Only properly sized material proceeds to grinding.

Ball Mill

Grinding Preparation



To Classification and Beneficiation

The crushing target should be selected from the requirement of the next process, not from the minimum size a crusher can produce.

Over-crushing increases fines and circulating load.
Under-crushing may lead to insufficient liberation and poor performance.

Key Project Inputs

ROM Top Size
Determines primary crusher feed opening and overall circuit configuration.

Ore Competency
Affects crusher selection, reduction ratio and energy demand.

Abrasiveness
Controls wear rate of liners and consumables, and influences operating cost.

Mineral Grain Size
Impacts liberation characteristics and beneficiation strategy.

Required Liberation
Determines how much size reduction is actually necessary.

Downstream Beneficiation Route
Sorting / DMS / Flotation / Magnetic separation each have different feed size requirements.

Process Decision Guidance

Coarser Liberated Ore
→ Potential Sorting / DMS
Remove barren gangue early and reduce material to the mill.

→ **Ore Texture and Liberation** →

Finer Intergrowth
→ More Grinding / Flotation Preparation
Further size reduction required to achieve adequate mineral liberation.