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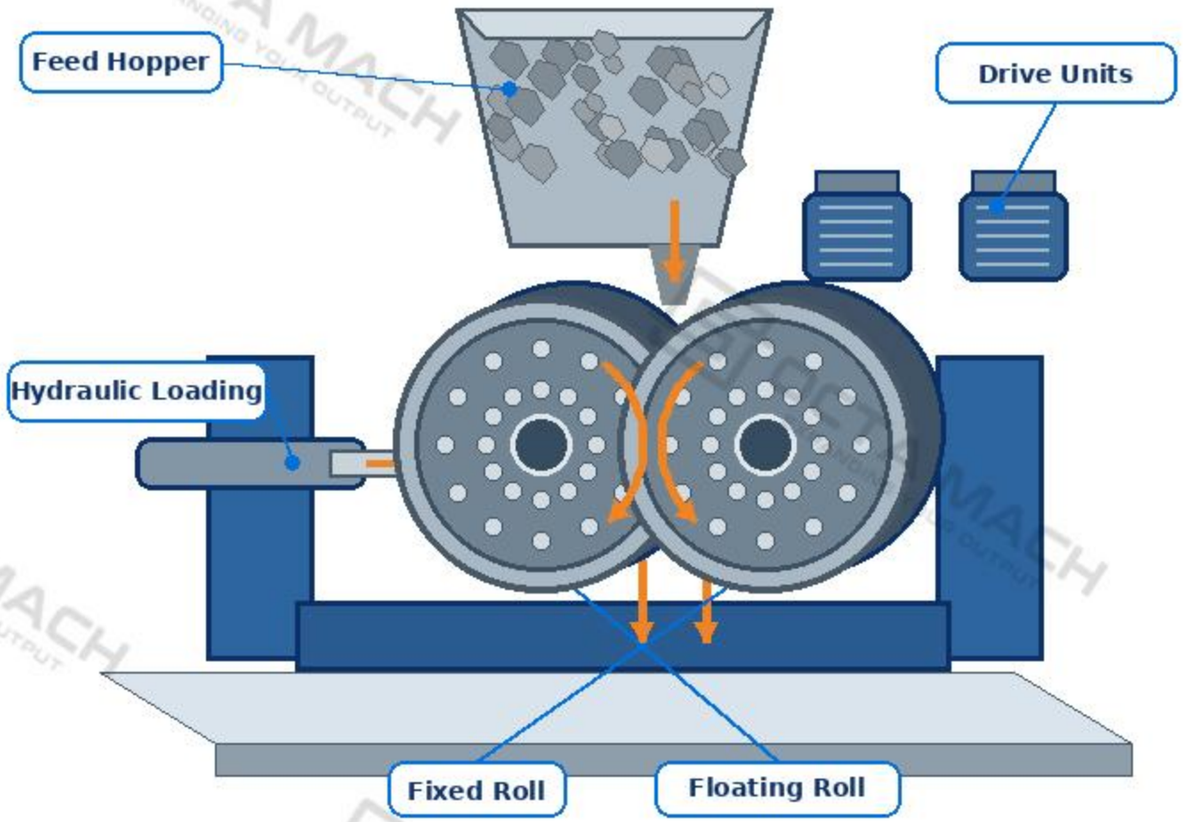
Project Requirements

Define Your Ore Grinding & Plant Integration Requirements

PROJECT REQUIREMENT OVERVIEW



PROJECT INFORMATION TO CONFIRM

PROJECT INPUT	DETAILS TO CONFIRM
Application	Iron ore, copper / gold ore, cement raw materials or other process duty
Feed material	Ore type, feed-size distribution and maximum lump size
Material properties	Hardness, abrasiveness, moisture and bulk density
Throughput target	Required fresh-feed rate and operating hours
Product requirement	Target product size, particle-size distribution and downstream process
Circuit configuration	Pre-grinding, finish grinding or other circuit arrangement
Site conditions	Available footprint, elevation, power supply and maintenance access

SELECTION PREPARATION SEQUENCE

01 Define Material → **02** Check Feed Distribution → **03** Set Product Target → **04** Confirm Capacity → **05** Review Site Integration

ENGINEERING NOTE

HPGR selection should be based on representative ore test work and the complete process duty — not on feed size or nominal capacity alone.
Confirm material properties, target product, throughput, circuit layout and site constraints before final equipment sizing.

Accurate process data helps match HPGR configuration to the ore, required product and plant conditions.

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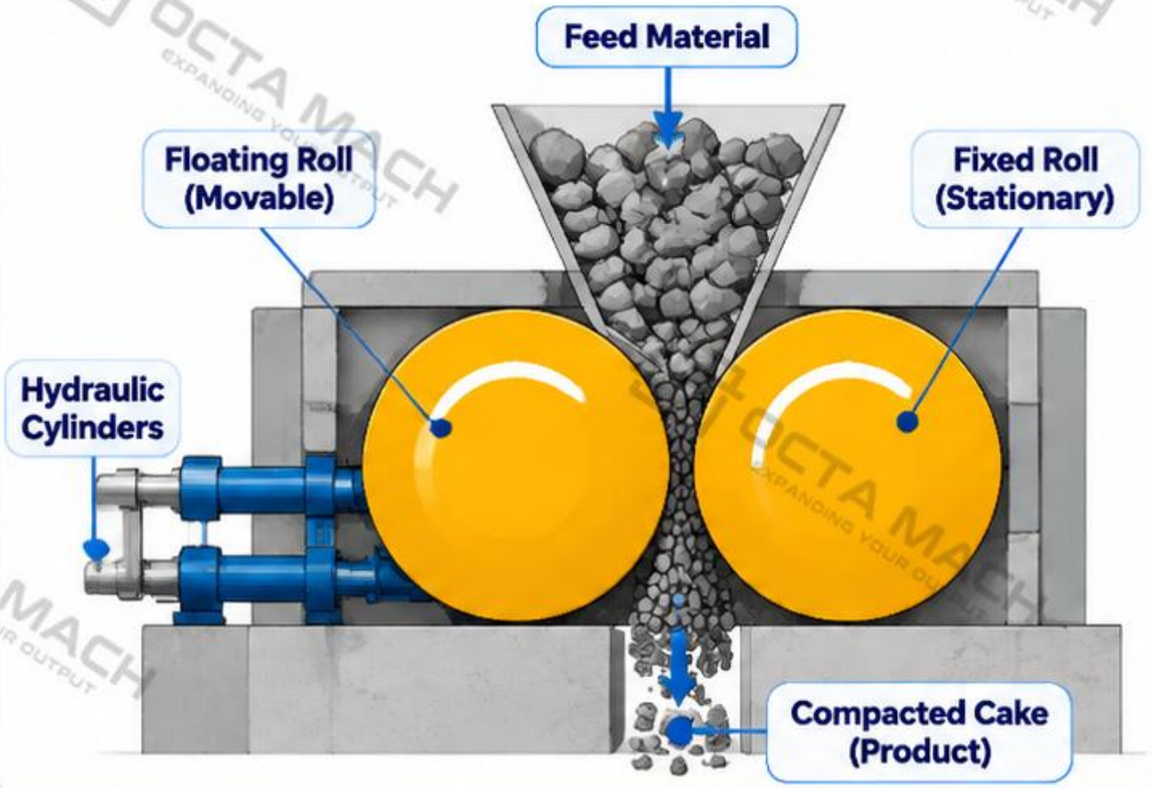
HPGR Working Principle

Inter-Particle Comminution by High-Pressure Compression

Comminution Principle Diagram



Five Stages of HPGR Comminution

1. **Material Feeding** — Crushed material is evenly fed into the narrow gap between the two rolls.
2. **Particle Bed Formation** — Particles are compressed to form a high-density particle bed.
3. **Inter-Particle Compression** — Particles are subjected to high pressure from the two rolls and from surrounding particles.
4. **Particle Breakage** — Particles are broken mainly by inter-particle compression (not by direct roll crushing).
5. **Compacted Cake Discharge** — The compacted material (cake) with a higher bulk density is discharged for further processing.

Process Sequence

Feeding → Particle Bed → Compression → Breakage → Cake Discharge

Engineering Note

- HPGR reduces particle size mainly through high-pressure inter-particle comminution.
- A stable and sufficient hydraulic pressure is essential for forming an effective particle bed.
- The process delivers a higher proportion of fines, low energy consumption and better downstream grindability.

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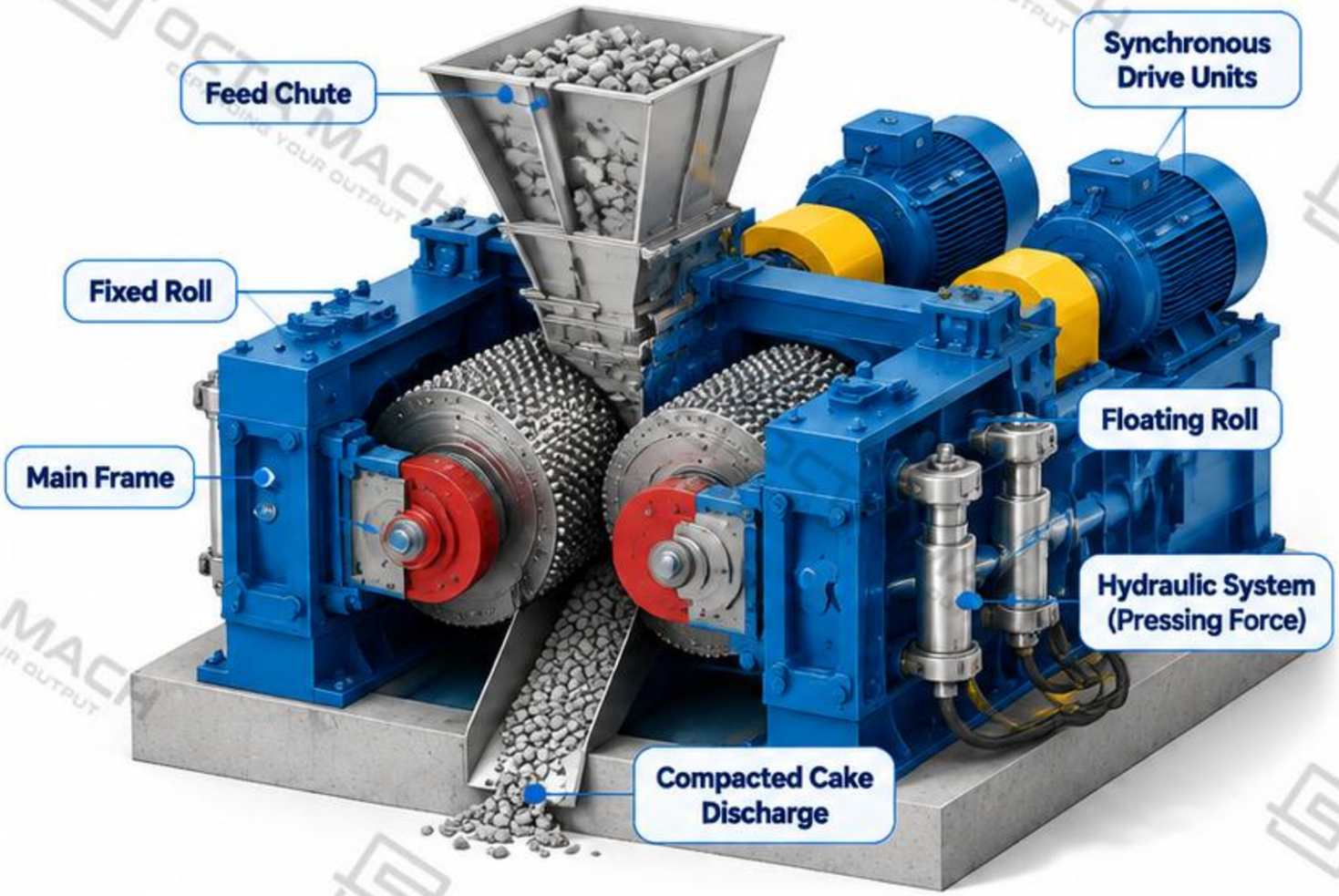
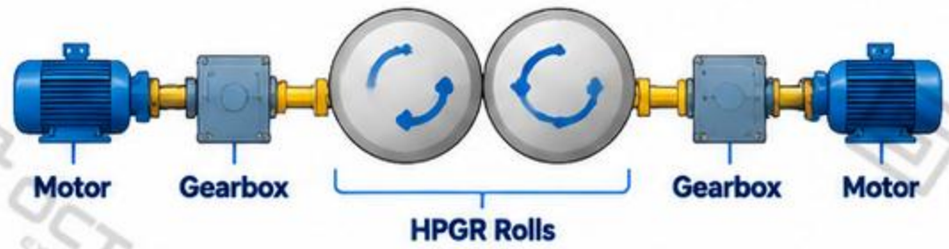
HPGR Structure & Synchronous Drive System

Robust Design for High-Pressure, High-Reliability Operation



Synchronous Drive System



Drive units synchronize roll speed and maintain the specified counter-rotation.

Key Component Details



Roll Surface (Studded Design)



Heavy-Duty Bearings



Hydraulic Pressing System

Structural Highlights

Rigid Main Frame
Supports roll assemblies and operating loads.

Synchronous Drive
Maintains the specified roll-speed relationship.

Heavy-Duty Bearings
Supports high radial loads and shaft alignment.

Studded Rolls
Improves material grip and protects the roll body.

Benefits

- Controlled roll loading and stable operation
- May reduce downstream grinding energy in suitable circuits
- Wear-part design supports planned maintenance
- Configurable for hard and abrasive ore applications

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HPGR Performance Parameters & Technical Specifications

A practical framework for equipment sizing, duty definition and performance verification

CORE EQUIPMENT PARAMETERS

PARAMETER	UNIT	SELECTION / CONFIRMATION BASIS
Roll diameter	mm	Selected HPGR model and roll design
Roll width	mm	Selected HPGR model and required capacity
Roll speed	rpm	Drive configuration and operating range
Installed drive power	kW	Motor rating and defined process duty
Hydraulic pressure	MPa	Hydraulic design and operating setpoint
Feed top size	mm	Feed-size distribution and circuit arrangement
Throughput	t/h	Ore test work, moisture and operating conditions
Product size (P80)	mm	Target grind and downstream process requirement
Specific energy	kWh/t	Measured or predicted value at a stated duty

! Values are model-specific; confirm against the manufacturer's datasheet and ore test work.

PERFORMANCE INDICATORS

t/h — THROUGHPUT
Capacity at the defined feed and operating duty

P80 — PRODUCT SIZE
Particle-size target for the selected circuit

kWh/t — SPECIFIC ENERGY
Energy per tonne at a stated test condition

MPa — HYDRAULIC PRESSURE
Operating pressure and loading stability

IMPORTANT **Capacity and energy figures are meaningful only when feed properties, product target and circuit conditions are stated.**

FROM ORE TEST WORK TO HPGR SIZING

01 — CHARACTERIZE THE ORE
Hardness, abrasiveness, moisture and feed PSD

→

02 — CONDUCT TEST WORK
Pressure, speed, gap and product response

→

03 — DEFINE THE DUTY POINT
Throughput, P80 and specific energy target

→

04 — VERIFY THE FULL CIRCUIT
Screening, recycle and downstream capacity

Representative engineering workflow — final sizing requires application-specific data.

OPERATING VARIABLES & CONTROL

- **Feed PSD** — Top size and size distribution
- **Moisture** — Influences feed handling and bed formation
- **Roll speed** — Affects material draw-in and throughput
- **Hydraulic loading** — Controls compressive force on the particle bed

Adjustments should be evaluated against product quality, throughput and energy.

Technical ratings must be tied to a defined ore type, feed condition, product target and operating point.

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HPGR Applications & Process Integration

Material suitability and process integration in mineral processing

Typical Material Applications



01 Iron Ore Processing

HPGR may be used for pre-grinding and preparation before downstream milling.



02 Copper & Gold Ore Processing

Pre-grinding can be evaluated before flotation or other recovery stages.



03 Diamond-Bearing Ore

High-pressure breakage may help ore liberation, subject to diamond preservation tests.



04 Cement Raw Materials

Roll pressing can be applied in selected raw-meal or clinker grinding circuits.

Typical HPGR Process Integration — Example Crushing/Grinding Circuit

01 Pre-Crushed Feed
Controlled top size and feed PSD

→

02 HPGR
High-pressure particle-bed compression

→

03 Classification
Screening or other size control

→

04 Downstream Processing
Milling, separation or recovery

Optional recycle

Engineering Note

Circuit arrangements vary with material characteristics, ore test results and final product requirements. Process suitability and expected energy performance must be verified for each project.

Illustrative process concept only • The material samples are representative graphics, not verified customer-site photography.