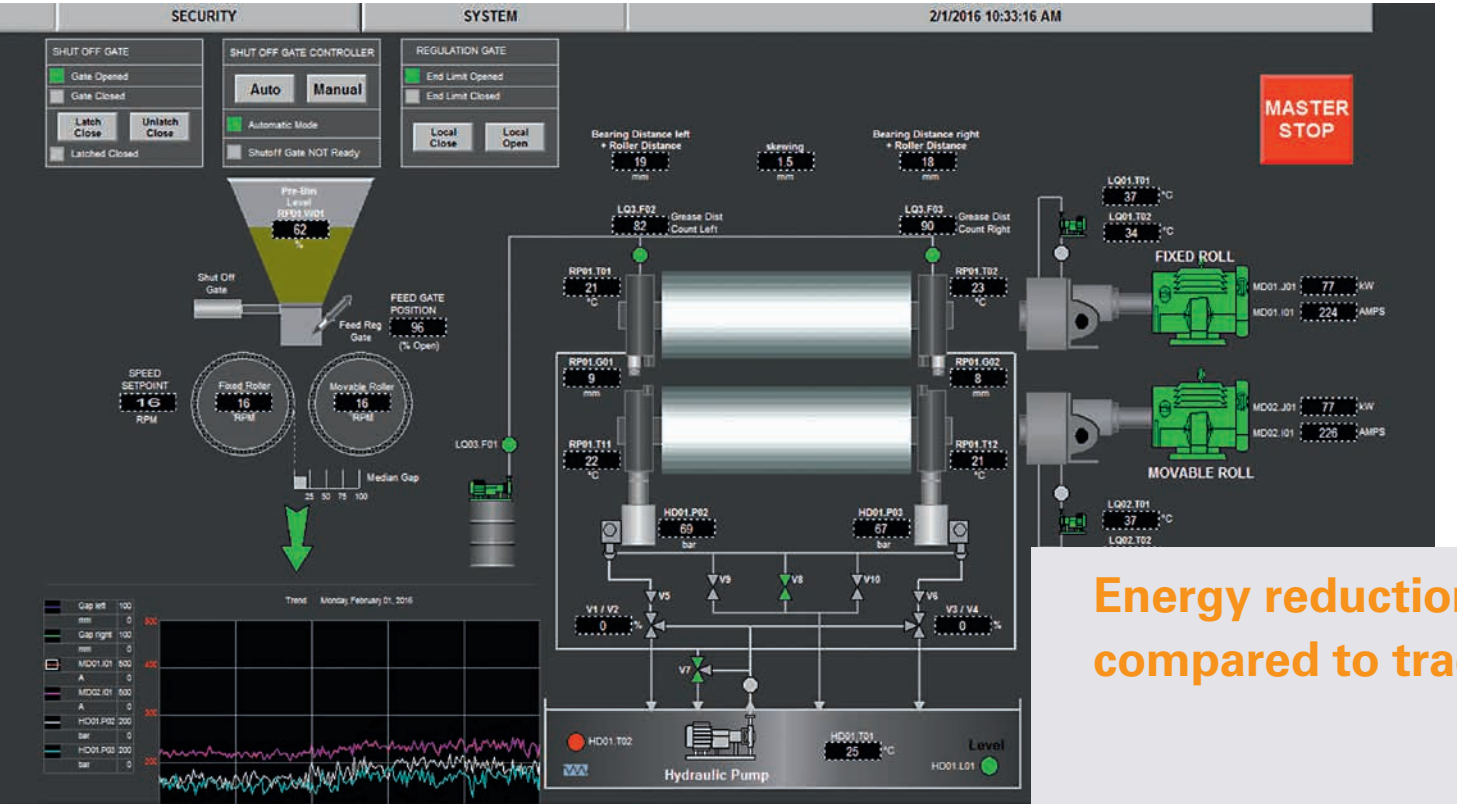
First choice for energy efficient grinding

WEIR

Minerals

Enduron® HPGR
High Pressure Grinding Roll



Extensive in-house testing facilities

High Pressure Grinding - proven technology

High Pressure grinding has become the “go to” technology for size reduction in mineral applications with more than 200 High Pressure Grinding Roll (HPGR) installations across the world. Most new greenfield projects include HPGRs as part of their standard comminution flow sheet. This is due to the HPGR’s proven success in the field over a wide variety of applications for more than 25 years.

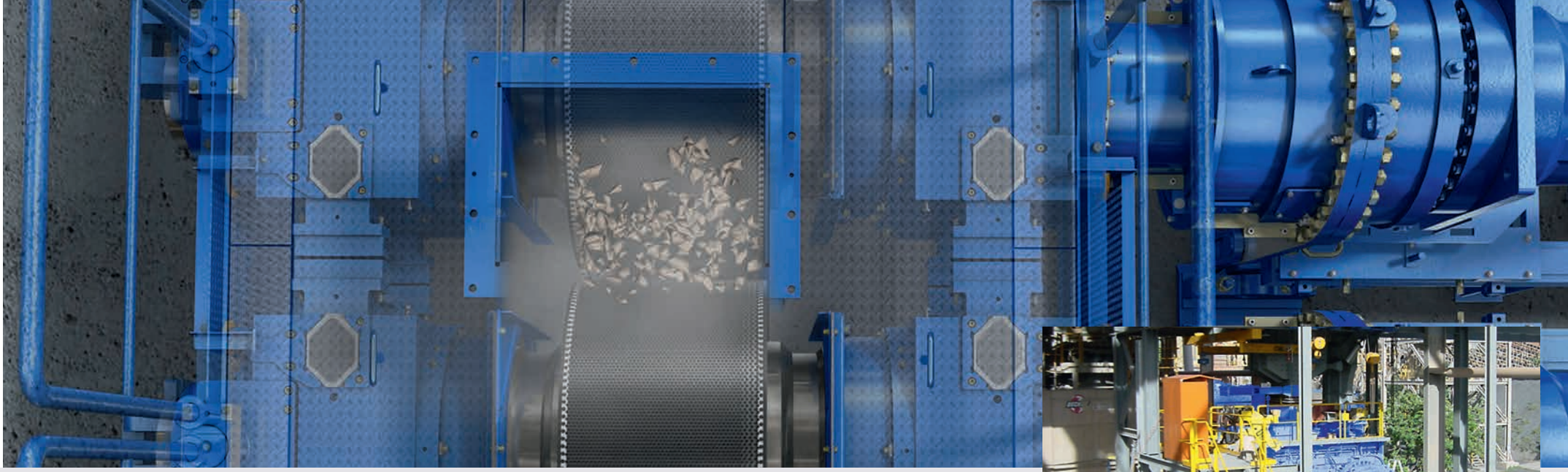
Energy reduction of up to 35% compared to traditional grinding circuits

HPGR technology has demonstrated to be a leader with low energy consumption, low maintenance requirements and high availability compared to other crushing and grinding options.

Unlike conventional single particle crushing, such as jaw crushing and cone crushing, the outstanding size reduction capability of an HPGR unit is the result of inter-particle comminution between the rolls. HPGRs are characterised by high material throughput rates with low operational costs and low long term capital investment.

Wide range of applications

HPGRs fit perfectly in comminution regimes across many applications. Tertiary and quaternary crushing stages can be replaced by a single large capacity unit operation, also having the ability to take-over part of the ball mill grinding task.
Requiring less process stages, an HPGR significantly reduces overall circuit energy consumption, grinding media consumption and wear cost. The Enduron® HPGR featuring KHD* technology can be utilised in a wide variety of minerals and size reduction duties, from coarse crushing for heap leaching through to iron ore pellet feed grinding.



Enduron® HPGR
Optimised grind, finer product and better results

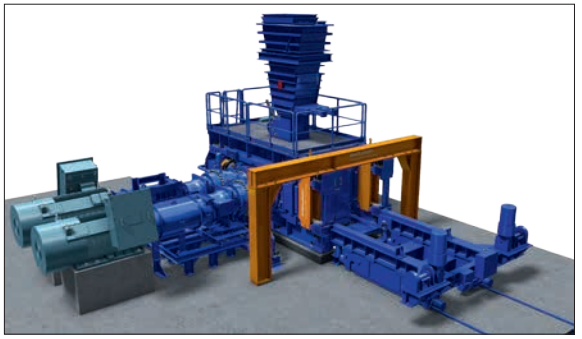
Diamond ore grinding, Australia

Our innovative grinding technology is backed by continuous research and in-house pilot scale HPGR test facilities. This results in superior equipment efficiency and reliability, providing a solid basis for circuit design and scale-up. We have extensive test facilities in Europe, Australia, North America and Latin America.

Assembly of an Enduron® HPGR in the Netherlands

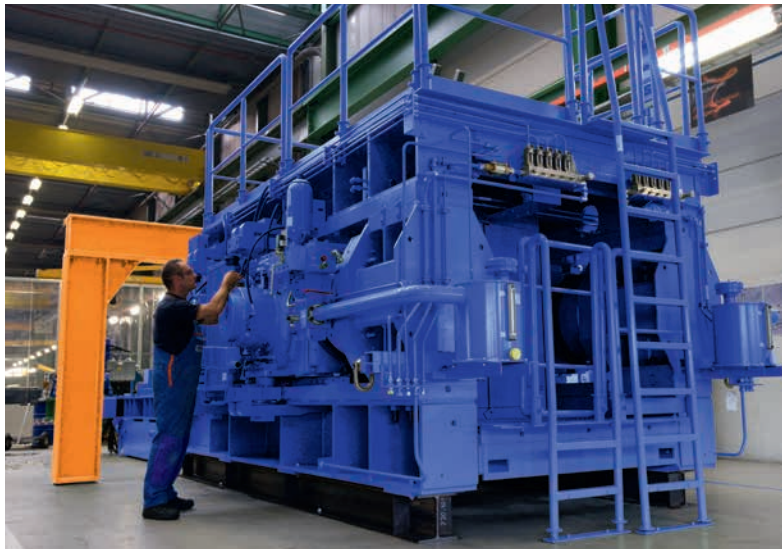
Iron ore grinding, China

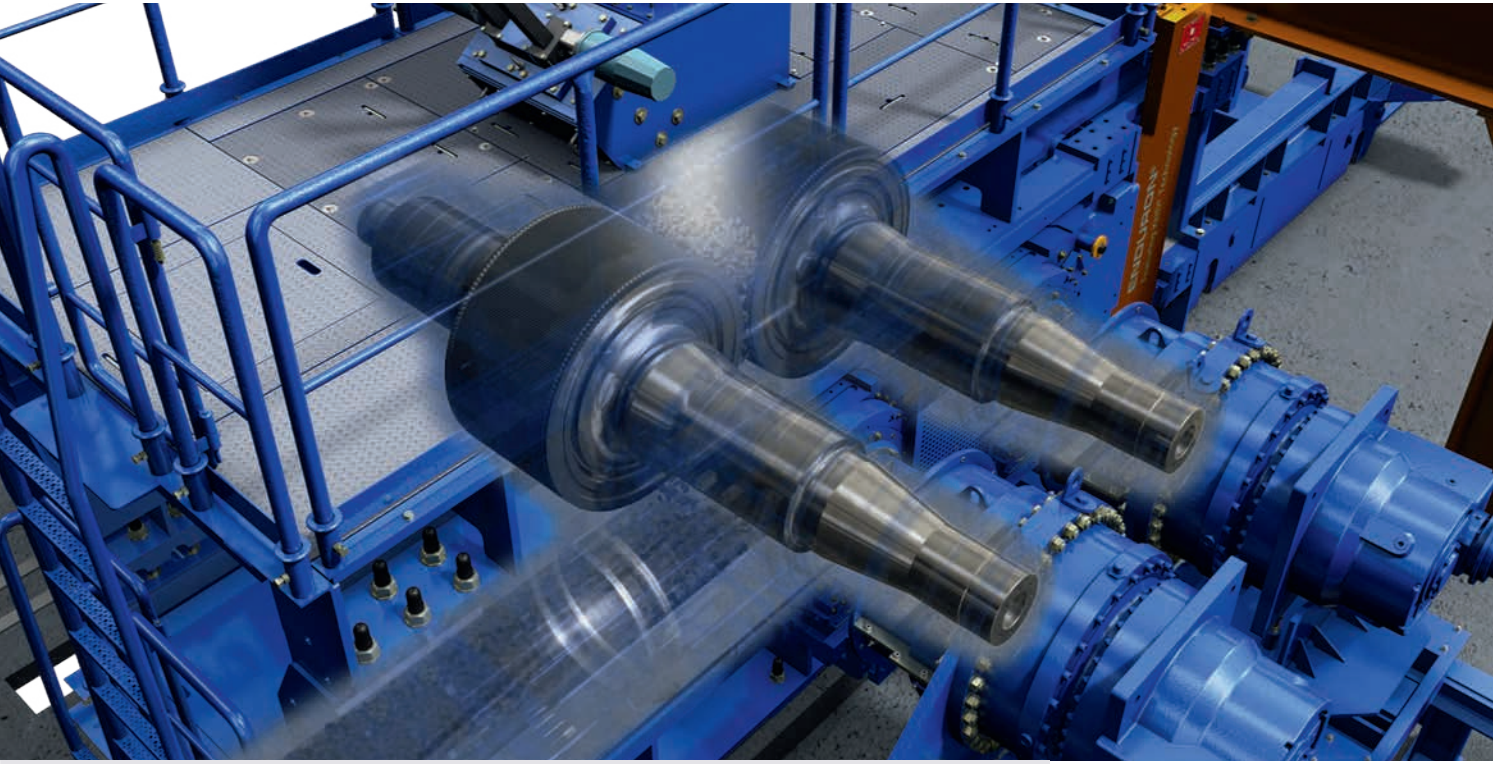
Main features	Your benefits
Unique roll diameter-width ratio	Maximising production of fines, minimising edge effects
Skewing	Allows for passage of tramp or oversize material while maintaining the best possible crushing conditions
Unique bearing construction with the ability to use grease or oil lubrication	Very efficient roll position and stress-free roll skewing control
Unique quick roller exchange without disassembly of feed chute or hopper	More efficient maintenance, less downtime, roll exchange time within 24 hours shut down
The selection and breakage characteristics of the process are substantially better than conventional methods	High savings in power consumption, up to 35% energy reduction
Highly efficient inter-particle grinding technology	Allows for wide feed particle size ranges, from 100 mm coarse ore down to micron size (pellet feed)
Superior quality stud-lined roll surface, industry leading wear protection (tungsten carbide material)	Guaranteed long tyre lifetime, high availability, and low operating cost for wear parts and maintenance
Large roll sizes up to 3.0 m	High unit throughput up to 9,000 t/h depending on application
High size reduction ratio and micro-fracturing	Highly efficient grinding and liberation of valuables from the ore leading to maximising downstream recovery compared to traditional grinding techniques
Small footprint	Easy integration in existing or new plant configurations
Low vibration, low dynamic forces	Minimises support foundation requirements
Low noise level, completely dust enclosed	Contributes to clean plant operation
Can be used in combination with dry classification	Efficient size reduction down to 20-50 microns in combination with air classifiers
Roll Spray system to improve autogenous wear layer on rolls	Maximum roll wear life in arid ore applications maximising downstream dry beneficiation efficiency



Applications

- **Coarse iron ore and pellet feed**
- **Pebble crushing**
- **Secondary/Tertiary grinding: copper, phosphate, gold, nickel, lead, zinc, chromite, platinum, vanadium and molybdenum**
- **Diamonds – selective liberation (lamproite, kimberlite)**





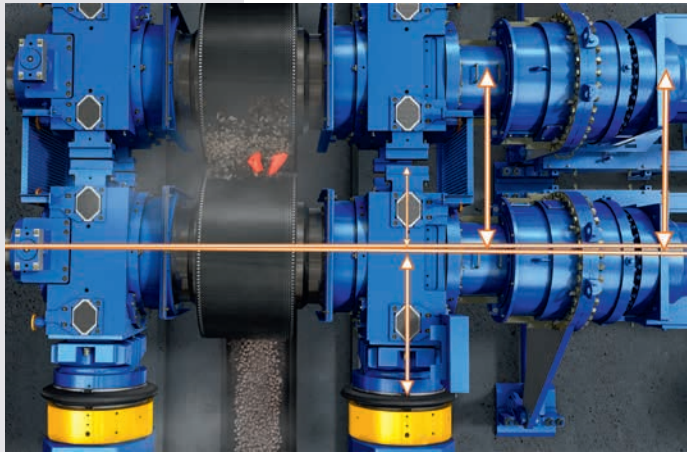
Operating models

HPGRs consist of two rolls that are identical in dimension, rotating in opposite direction at the same speed. The main grinding action is a result of inter-particle crushing. Extreme pressure causes the particles inside the compacted material bed to fracture into finer particles and also causes microfracturing at the grain size level.

- Model RPM: HPGR with 4-row cylinder roller bearings - oil lubricated
- Model RPP: HPGR with spherical roller bearings - grease lubricated

The need for skewing

Skewing allows for the passage of tramp or oversized material while maintaining the best possible crushing conditions. Our unique bearing construction allows for stress-free skewing control. Skewing maintains pressure across the surface of the roll during uneven feed conditions (typical in minerals applications) allowing maximum size reduction. It is a proven system enabling movement of rolls without field failures.



Operating details

- Specific pressure typically max. 5N/mm^2
- Tyre diameter from 800 mm to 3000 mm, tyre width from 250 mm to 3000 mm
- Pressure force from 2000 kN to 27000 kN
- Capacity typically from 200 t/h to 9000 t/h

Customer Care
Spanning 70 countries

At the heart of almost every mine around the world you will find Weir Minerals' high quality mineral processing equipment. Our machines mean your production flow will consistently perform at the optimal level.

Weir Minerals products and services for minerals applications are world class and include pumps, valves, HPGR's, spools, lining, hoses, crushers and separation equipment and more.

Long-term partnerships

At Weir Minerals we have gained a worldwide reputation for consistently meeting our customers' requirements, dependable customer support and extended field support. By aligning our own objectives with those of our customers, we build long-term and mutually beneficial partnerships. We provide comprehensive support under flexible servicing agreements tailored to our customer needs and ensure on-time delivery of genuine parts reducing operating costs.

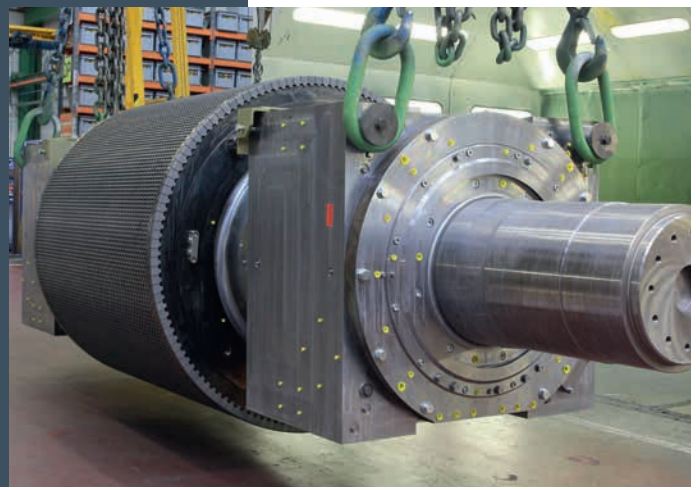
Gold ore grinding,
Kazakhstan

Iron ore grinding, Australia

The Genuine Article

The Enduron® HPGR tyre - an innovative and different design which provides:

- Improved wear life: up to 20% better than available alternatives
- Guaranteed performance
- Highest quality studs: no recycled material
- Lateral stud design is optimised for impact load: unique clamping system with slots and rounded transition
- Optimised diameter/length ratio of studs which results in:
  - Optimum utilisation of full stud length
  - High output of product - smaller diameter gives higher peak load on ore
  - Optimum autogenous wear layer integrity, generating longer lifetime
  - Minimal risk of consequential damage in the event of stud failure, because of smaller exposed area compared to alternate brands



Customer care activities

- Genuine spare parts – guaranteed performance.
- Installation and commissioning by highly qualified and dedicated service engineers.
- Local support available throughout the globe.
- On-site training and workshop training available at our training academy for operators and maintenance professionals to improve general knowledge and equipment maintenance.
- Customer helpdesk and technical advice to keep your processing plant in peak performance.
- Site visits for performance reviews, inspections and recommendations to optimise performance.
- Reliable and cost effective repairs, overhauls and modifications.
- Spare parts are available from our manufacturing facility, regional distribution centres that cover every continent or from an agreed consignment stock on-site.
- 24/7 on-site technical assistance to ensure optimised performance of our equipment and minimise unplanned downtime.

Low Total Cost of Ownership

With a service and support structure spanning 70 countries, we are with you every step of the way to help minimise your total cost of ownership.

Minerals

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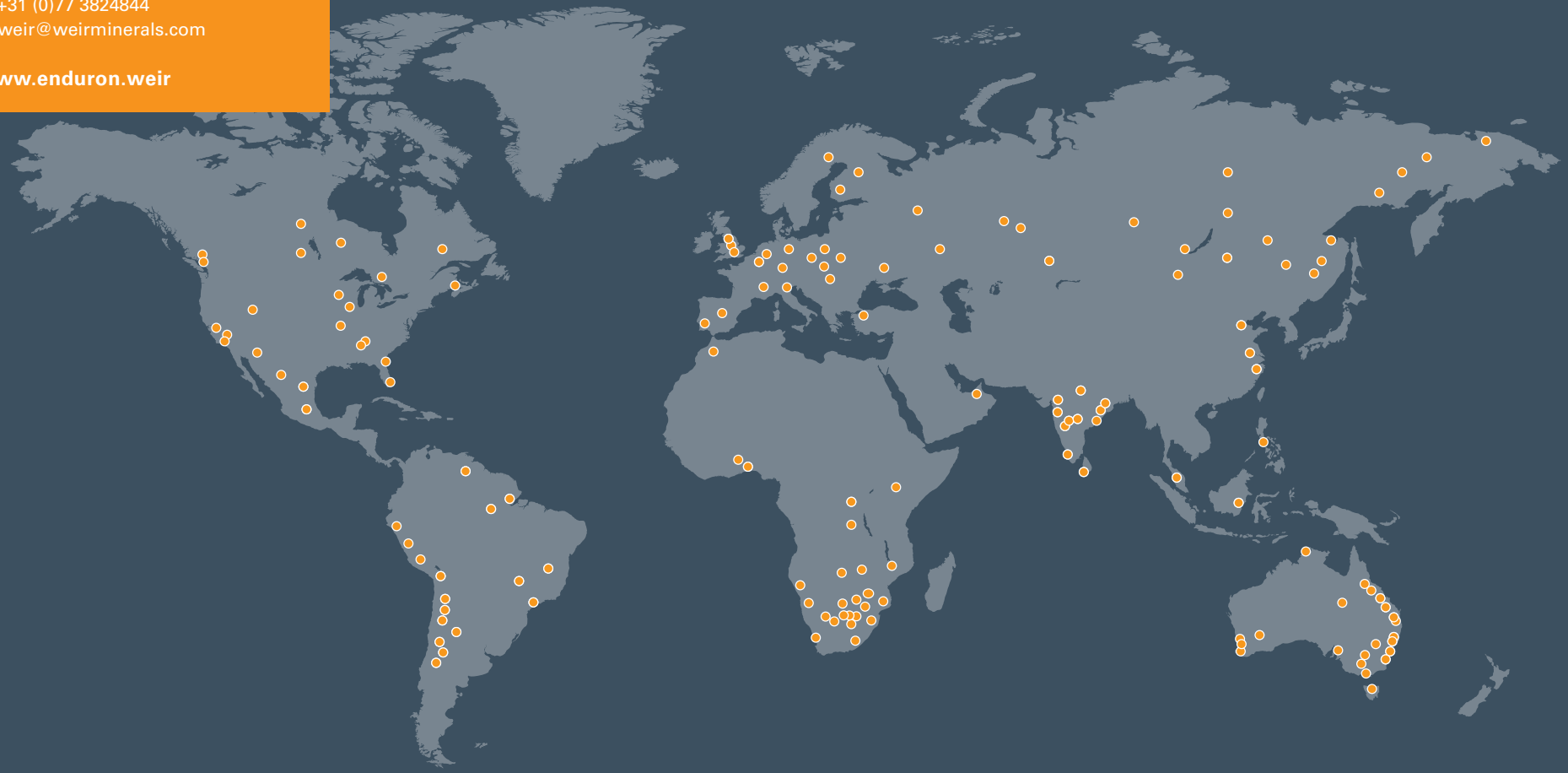

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