Industrial Motors

Commercial & Appliance Motors

Automation

Digital & Systems

Energy

Transmission & Distribution

Coatings

SOLUTIONS FOR MINING

Complete portfolio
for every step of the process

Driving efficiency and sustainability

Complete electric package

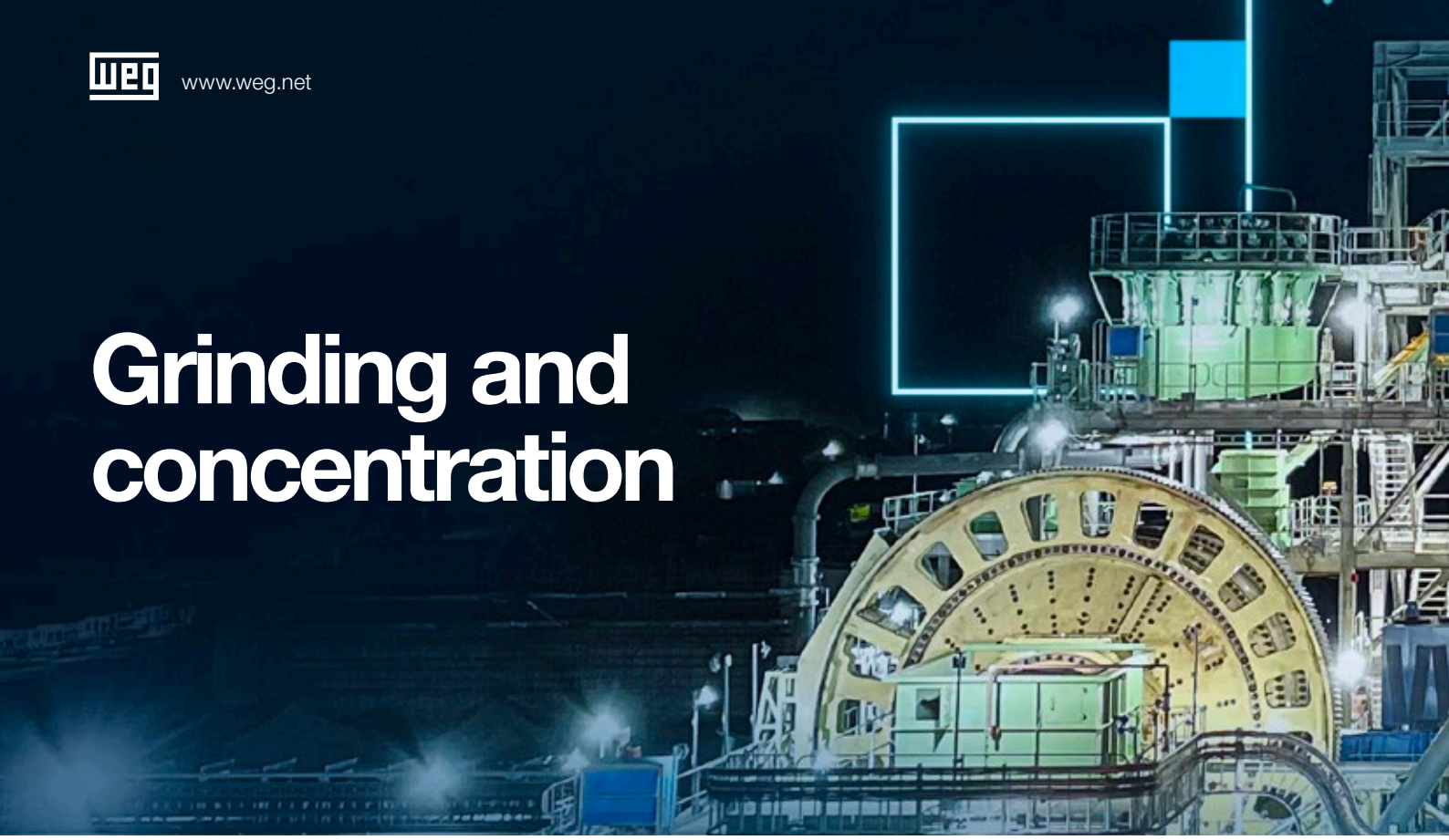
Mining is a fundamental activity that contributes to the development and progress of the areas where it operates. It provides essential raw materials for various industries and infrastructure sectors, while maintaining strict sustainability and safety standards to minimize its impact on the environment and local communities.
Compared to other extensive activities, mining is performed in a relatively small area. It plays a crucial role in modernization and electrification, and in making energy usage more efficient. It provides materials such as aggregates, iron, and copper for civil construction, as well as high-tech products such as lithium, rare earths, and graphene used in smartphones, batteries and electrical equipment. Additionally, mining provides fertilizers like potassium and phosphate for agriculture and is even used in the medical and pharmaceutical industries.

WEG solutions allow mining sites to have flexible, safe and reliable installations, with operational stability and high production levels.

- Electric packages, including e-houses, low and medium voltage panels, distribution switchboards, control centers for intelligent or conventional motors, conventional and mobile substations, supervisory automation systems, power transformers, among others.
- Low and medium voltage electric motors, gearboxes and gearmotors with variable speed drives for material handling (conveyor belts, reclaimers, bucket-wheel excavators), crushers, flotation cells, slurry and mill pumps, high pressure pumps for water lifting systems (desalination plants), etc.
- Mill drive solutions such as low speed synchronous motors for single or dual pinion mill configurations, wound rotor motors with liquid rheostat starters and VFD driven squirrel cage induction motors.

The combination of ***skilled staff, industry expertise and continually updated manufacturing methods and processes, in addition to state-of-the-art laboratories***, ensure that WEG products are suited to a wide range of applications and operating environments worldwide.

1. **Grinding and concentration**
2. **Material handling**
3. **Solutions for substations**
4. **Pumping systems**
5. **Rail car dumpers**
6. **Electrification and energy storage system**
7. **Digital solutions**



Grinding and concentration

Mill drive systems

WEG's experience with mill drive systems offers the most reliable and efficient solutions for grinding facilities.

At the heart of a concentration plant, ball and SAG mills must be driven by a package of solutions that fits the mineral characteristics complying with the entire process. Fixed or precise variable speed, high starting torques, different types of couplings and cooling systems, whatever is required, WEG can provide a solution from its wide range of electric products, such as large motors and drives, switchgear, transformers and gearboxes.

With mines working with ever lower material recovery rates, higher volumes are required to be moved and processed. To meet this demand, plants must have flexible drive systems to maximize productivity. WEG can offer the right drive system according to the toughest requirements of all sites and mill suppliers.

- Wound rotor motor/slip ring + liquid rheostat starter and associated electric equipment, such as switchgears and slip energy recovery systems.
- Low speed synchronous motors direct coupled to the mill pinion (without gearbox) and starting direct-on-line (pneumatic coupling) or by variable frequency drives
- Squirrel cage motor + variable frequency drive
- Squirrel cage motor + frequency drive for HPGR mills with precise speed and torque control
- Related electric equipment: phase shifting transformers, distribution switchboards, e-houses
- Gearboxes and gearmotors
- Flexible couplings

Kamoa Copper in the Democratic Republic of Congo

Global references

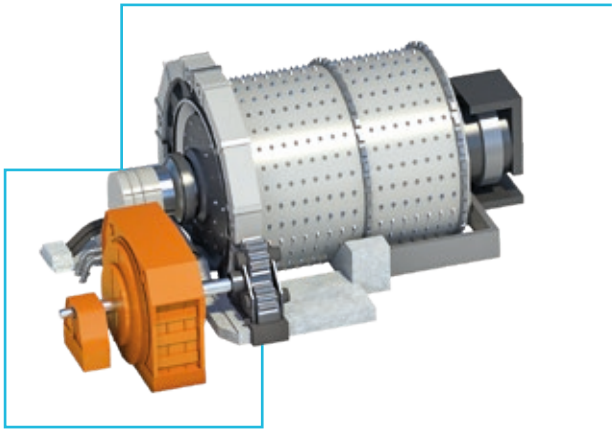
Codelco Teniente - Chile
Single pinion ball mills – LSS Motors (Retrofit)

Kamoa Copper - DRC
Democratic Republic of Congo

Potrerillos Codelco Salvador - Chile
Single pinion ball mills - SCIM + MV VFD

NX Gold - Nova Xavantina - Brazil
Single pinion ball mills: Slip ring motor + Main gearbox + Flexible couplings + Squirrel cage motor + Auxiliary gearbox

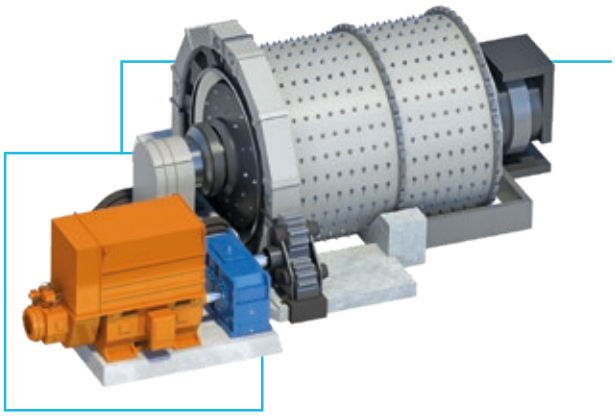
Fixed speed



Low speed synchronous motors

Synchronous Motors are widely used in fixed speed mill drive systems with the use of an air clutch between the motor shaft and the mill pinion to provide a smooth starting method. Using Synchronous Motors can also provide power factor correction to offset other lagging loads via field excitation control; these motors can be designed with a high number of poles, achieving mill rated speed when coupled directly to the mill pinion without the use of gearboxes.

In addition to high efficiency levels, power factor correction, high torques and low starting current, constant speed under load variations and low operating and maintenance costs are the main reasons why WEG Synchronous Motors are used in mill driving systems.



Induction motors

For ball and SAG/AG mills with single or dual pinion configuration, Slip Ring Motors drive the gearboxes and are normally used when fixed speed and low starting current are required.

WEG Induction Motors (Master Line) are designed with air cooling system (totally enclosed air-air cooling) or water (totally enclosed air-water cooling), high efficiency, reliability and separated slip ring unit, avoiding winding contamination from brush dust.

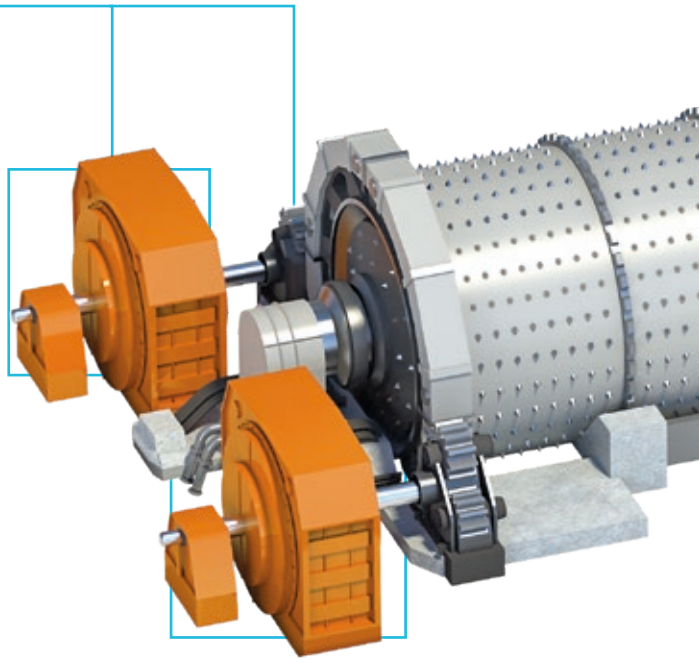
Combined with the operational advantages offered by the use of slip rotor motors, WEG has developed a motorized brush lifting system that is responsible for the rotor short circuit when the motor reaches its rated speed, taking advantage of the high starting torques and reduced starting current, while minimizing wear on brushes and slip rings, drastically reducing mill downtime for maintenance.

When adopting speed variation, slip energy recovery systems can be used in conjunction with the traditional starting system (liquid rheostat) in order to recover the energy dissipated from the rotor circuit to the main bus bar.

Variable speed

Single or dual pinion drive system

Designed to drive and fully control MV Motors in SAG/AG, Ball and HPGR mills with dual or single pinion configuration, WEG medium voltage frequency drives use state-of-the-art technology, with a multilevel IGBT topology, reducing motor harmonic currents to extremely low levels. Complying with different market requirements, WEG offers the MVW01 drive with medium voltage IGBTs and the MVW3000 series with cascaded cells, which uses combined low voltage IGBTs to provide the necessary voltage to the load. The input rectifier configuration in a multipulse arrangement reduces current and voltage harmonic distortions to the power supply network, meeting the recommendations of IEEE 519. WEG drives operate with a 32-bit microprocessor, providing high precision in speed control /torque for single or dual drive with load sharing. The load sharing functionality simultaneously controls two motors in a master-slave configuration, allowing the drive of very high-power mills. WEG supplies the complete drive system for mills, providing reliability, machine availability, ease configuration and peace of mind, as the input switchgear, the dry or oil phase shifting transformer, variable frequency drive and induction or synchronous motor are manufactured and can be string tested at WEG laboratories.



Following best practices for process control, key mill control functions such as detection and release of frozen charge and feed rate control, can be implemented in an internal algorithm to the WEG frequency drives MVW01 and MVW3000. This eliminates the need to program and control these functions via an external DCS or PLC operation.

HPGR mills

For HPGR mills, the WEG drive system can be configured to precisely control each motor coupled to the rolls in a master-slave configuration with speed and torque control. The main challenge overcome by specifying this solution is the guarantee of integrity and performance of the assembly evidenced by the high number of electrical packages supplied by WEG to different markets.

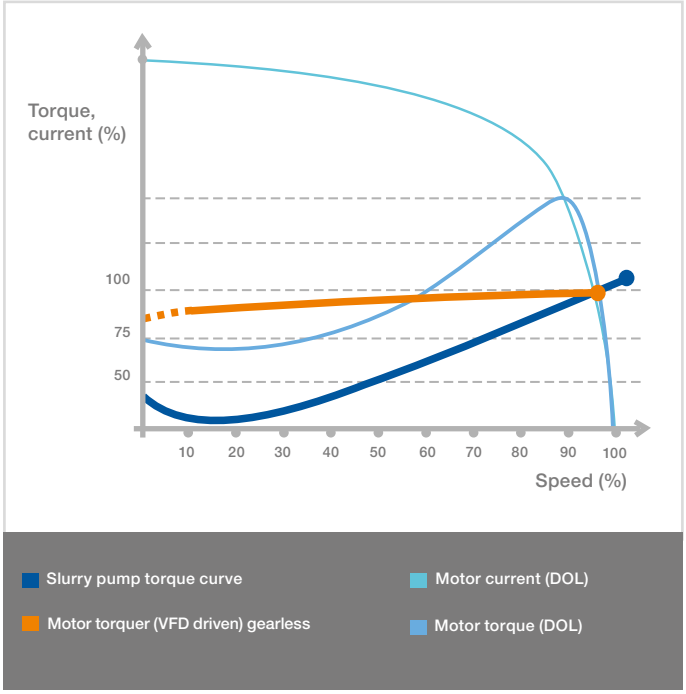
Slurry pumps

Concentration plants count on many pieces of critical equipment. This package includes slurry pumps for mill discharge and the cyclone feed process.

Traditionally, slurry pumps are driven by squirrel cage induction motors coupled to a gearbox in order to reach the rated pump speed. This gearbox drive, both centrifugal and diaphragm, has been widely installed in several mining concentration plants using WEG motors, gearboxes, gearmotors and drives.

An alternative to this is the gearless drive concept, which eliminates the gearbox between the pump and the motor, increasing overall efficiency and decreasing maintenance cost and downtime. This variable speed drive configuration is achieved by a low speed squirrel cage induction motor system and variable frequency drives, allowing the optimization of the slurry flow through the control system and keeping energy consumption at its highest efficiency level.

To achieve this, the motor rated frequency can be adjusted to the most efficient operating point based on the specific pump torque curve (see graph).

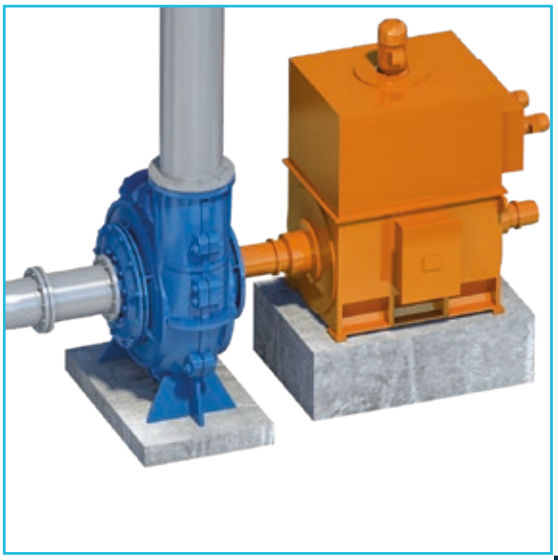


Main features of WEG MVW VFDs

- Compatibility with most commonly use network communication systems.
- High voltage semiconductors (6.5 kV for medium voltage applications) reduce the number of components, eliminating the use of series-connected devices, which results in higher efficiency and reliability.
- Power system in 12, 18 or 24 pulses to reduce harmonic distortions in the power supply network input.
- Available as per NEMA or IEC Standards.
- Sensorless vector control and closed loop vector control
- Multilevel structure that reduces harmonic currents on output to motor.
- Draw-out style power modules (quick and easy maintenance).
- High efficiency (>98.5%) and power factor (>0.95).
- Air or water cooled.

Main motor features

- Rated power, number of poles and rated frequency are calculated to provide the best cost-benefit for the system. Since the motor is driven by a medium voltage PWM frequency drive, the motor can be designed to operate at the pump's most efficient point.
- Fan-cooled motors with wide speed range for constant torque operation.



Flotation cells

WEG products are designed with innovative technology, high efficiency and focus on reducing operating costs. They meet the toughest flotation process requirements helping the mining operations to ensure the best results.

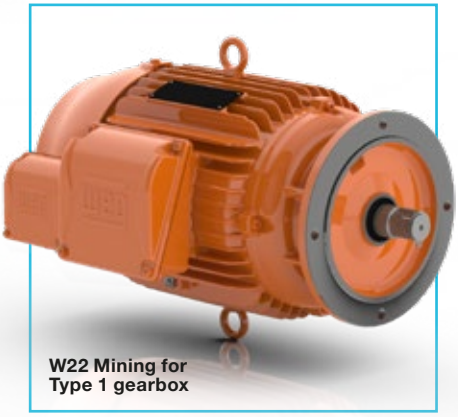
W51HD Mining motors are designed to operate in severe environments. The IPW66 Degree of Protection, ensured by the exclusive W3 Seal® bearing sealing system, together with the Permatex chemical gasket, in all mechanical fittings, guarantee that the inside of the motor is isolated from the external environment, avoiding bearings and winding to be affected when operating in an environment full of solid and liquid contaminants.

They are designed in such a way to resist to chemical abrasion, resulting in increased motor lifetime while operating at the flotation processes.

W51HD Mining

Special features

- Several assembly and coupling options (vertical shaft up with pulleys and belt coupling, vertical shaft down or horizontal shaft directly coupled to the gearbox).
- Shaft and bearing designed to withstand high levels of radial load by pulley and belt coupling.
- Cast iron or steel fan cover.
- Cast iron fan with high protection against chemical abrasive materials.
- Stainless steel fastening parts and special painting for high surface protection.



W22 Mining for Type 1 gearbox

Material handling

WEG has the expertise to offer solutions for several material handling systems. From low voltage motors, small gearmotors to the latest generation systems combined with motor, gearbox, variable frequency drive, electronic components, transformers and e-houses, for applications that demand reliability and production availability, such as conveyor belts, bucket-wheel excavators, stackers and reclaimers.

W22 crusher duty mining motor

Designed to operate in applications where solid and liquid materials may fall down, which could damage the motor or block the air circulations on the cooling fins, increasing the operating temperature and reducing the motor lifetime. This can often occur on mining operating areas near conveyor belts, screens, crushers and pumps.

The W22 Mining motor fitted with protection cover keeps the motor heat exchange, increasing performance, reliability and lifetime.

Built to last

W22 Mining motors are built with high quality FC-200 cast iron, ensuring long-lasting operation and high performance under tough conditions. The fan cover design is highly resistant to impacts, the drive-end and non-drive end are designed for improved bearing heat dissipation and structural strength. Protected by high-performance WEG paint systems, motors undergo a 240-hour ASTM 117B salt spray test.

VFD operation

The exclusive WISE® insulation system used by WEG increases the windings dielectric strength, allowing VFD operation up to 575 V without requiring further modifications.

This results in high flexibility and extended motor lifetime.

Gearboxes for stockyar machine long travel

WEG-CESTARI gearboxes were designed for industrial applications and ensure excellent performance and reliability at severe operating conditions. They combine high power density and low maintenance, in addition to standing out for their high mechanical strength, long-lasting and low vibration levels. This is a perfect solution for the mining sector.

Stockyard machines

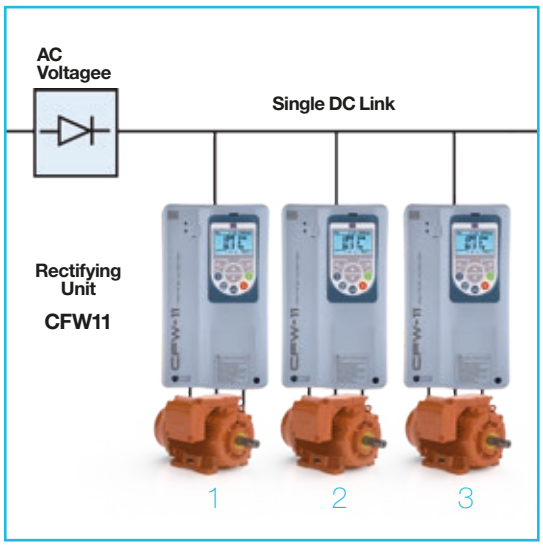
Overland conveyor belts drive system

Whatever you need for long-distance overland conveyor belts, WEG can provide the right solution with electric motors, drives and energy systems. The user-friendly operation of the customized solutions maximizes productivity and minimizes maintenance, reducing environmental impacts while saving energy.

The CFW11 drives incorporate the world´s most advanced drive technology for three-phase AC induction motors. The Vectrue™ Technology allows the new WEG drives to combine V/F, sensorless and closed-loop vector control techniques (with encoder) on a single product.

True open-loop vector controls allow for high torque and fast dynamic response. The self-tuning function allows automatic drive set-up to match the motor and load in vector modes.

Frequency drives are fitted with Optimal Flux® technology, increasing torque at low speeds and eliminating the need for independent ventilation (or oversizing motor).



The long-distance overland conveyor belts and stockyard moving machines, among others, are driven by several equipment that work in synchronization through the use of encoders installed in specially designed electric motors and frequency drives.

These arrangements require Master/Follower coordination of torque and speed control via communication network.

Controls can also be integrated into the customer's automation system and installed in a customized electrical switchroom.

TCLD dedicated gearboxes

For systems where concentrated energy is required, slip ring motors can be applied, for which liquid starting rheostats are designed to operate in parallel and guarantee the same resistance to the motors that share the full conveyor belt load.

In these high-power applications, slip ring motors are robust, easy to operate and cost-effective.

Such systems allow for reliable mechanical arrangements between the drive pulleys and buckets, along with sharing the motors load.

M Mining Motor

Electric equipment for mining handling materials

WEG e-Houses can be installed directly on the structure of material handling machines (stackers, reclaimers, bucket-wheel excavators, etc.), and they are entirely designed for the handling conditions and vibrations characteristic of these equipment.

The automation and control solutions for these machines allow full moving, rotation and conveyor systems control through WEG frequency drives, in addition to allowing critical overload conditions and operational redundancy through customized solutions for each project, including bypass by contactors and standby drives.

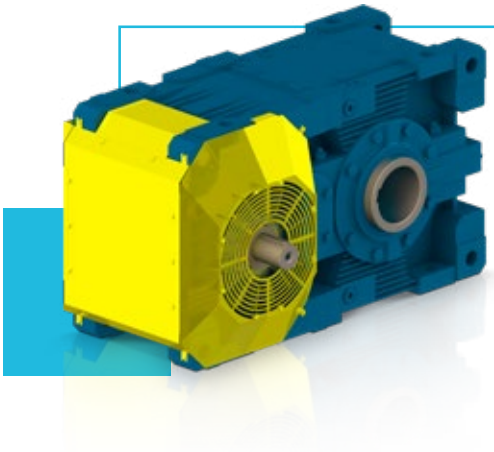
Braking systems or use of energy regeneration related to this equipment are also integrated to the electric package supplied by WEG.

Easy Maintenance

Industrial braking systems require periodical brake adjustment to ensure correct operation.

Therefore, any reduction of time for these adjustments represents gains of productivity, since the equipment downtime will also be shorter.

WEG's Easy Maintenance technology provides easy access to the brake internal components, allowing its adjustment without removing the fan, which is a benefit that offers maintenance safety, prevents motor damage, speeds up the process and reduces the risk of accidents, in addition to maintaining the components arrangement and the motor thermal conditions.



Overland Conveyor Belt Gearbox

WEG-CESTARI provides orthogonal and parallel gearboxes installed in conveyor belts, designed to be compact, with thermal dissipation solution through fans, Taconite anti-dust seal and split nodular cast iron frame extremely resistant to mechanical forces. Whenever required, WEG can supply welded steel frame.

Solutions for machine safety and general purpose sensors

Aluminum built cable operated emergency switches; IP67 and built-in signaling are the perfect safety solution for conveyor belts. With robust mechanism, suitable for outside environments, and indication signaling for operation and system nuisances, they guarantee operator safety and accurate status information.

WEG provides solutions for all types of machine safety applications, such as coded sensors, coded switches, safety relays (all functions), safety controllers, light curtains, safety wedges and an endless line of industrial sensors to match with a major diversification of industrial products.

Besides that, WEG provides solutions for monitoring safety switches and protection against misalignment of conveyor belts, in addition to inductive and capacitive sensors, light curtains, lock switches and other sensor like instruments present in stockyard machines and mining conveyor belts.

www.weg.net

Substations

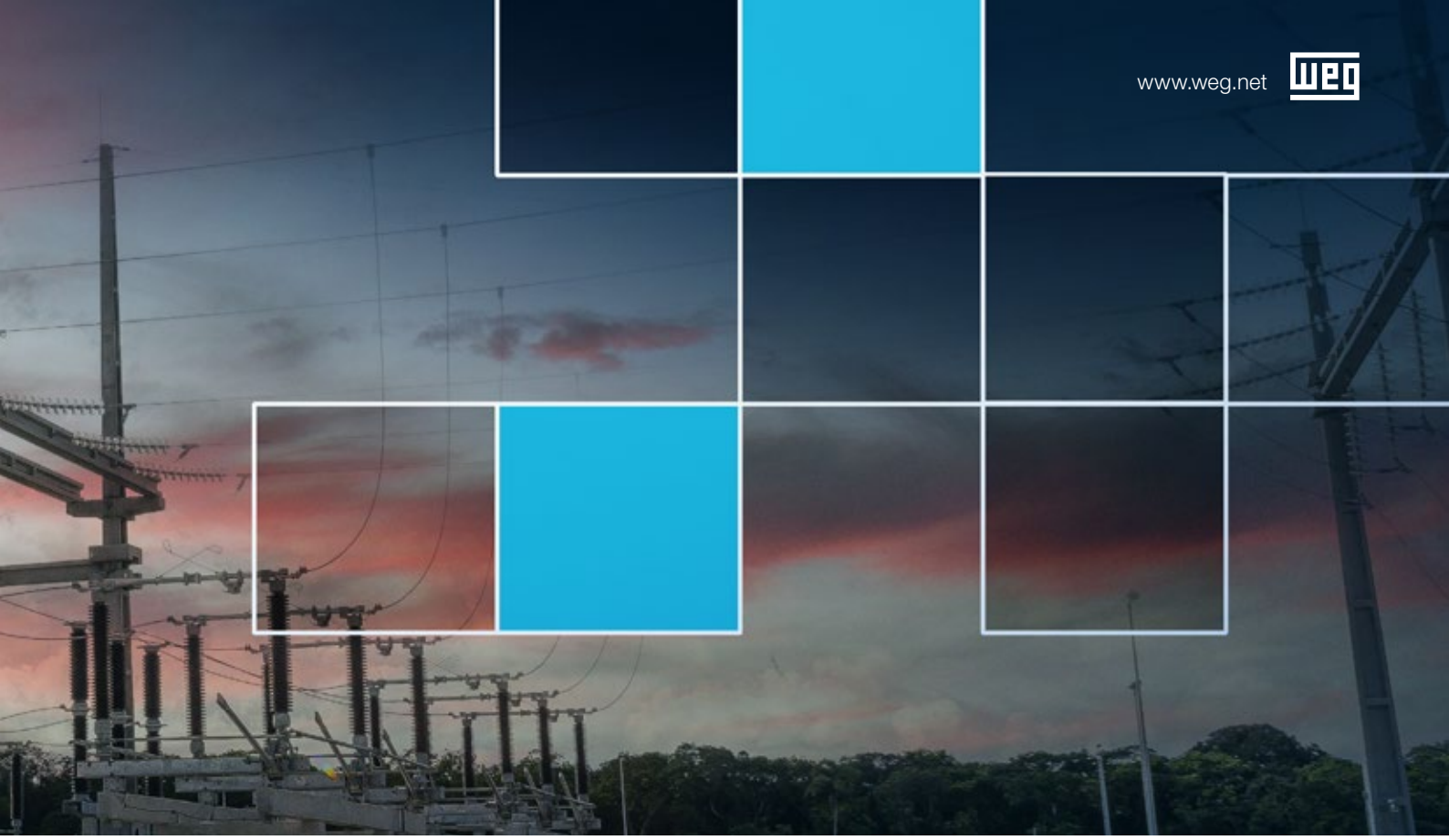
A conventional substation is a set of electric equipment and systems, with the objective of adapting different voltage and current levels, including the transformer and other elements required for the operations, protection and control of the power set, allowing safe distribution of energy to transmission systems and power grid.

Competitive advantages

WEG has know-how and experience to design and build high voltage electrical systems in Brazil, offering suitable solutions for conventional substations on a turnkey basis, for high voltage substations at all voltage levels up to 550 kV and in all market sectors (industries, transmission and distribution utilities, hydraulic, thermal, wind and solar power generation).

Turnkey solutions

Our turnkey solutions go beyond technical studies and the supply of product. WEG supplies products and materials, civil construction, specialized services, including commissioning and after-sales, coordinating and integrating all participants in the process. It is the complete solution for your demand. We meet the requirements of different projects and electricity utilities as well as the specific requirements of each project.



Our main solutions

Stepdown substations

Located close to load centers, they are intended to reduce voltage levels by adapting to the needs of each specific group of consumers.

Distribution substations

They can belong to both the electric power utility or large users. They receive electric energy from transmission or sub-transmission systems, stepping down the voltage to the required levels for direct use by consumers.

Sectioning, maneuvering or switching substations

They interconnect circuits of the same voltage level providing their multiplication and flexibility in the operating procedures of transmission and sub transmission networks.

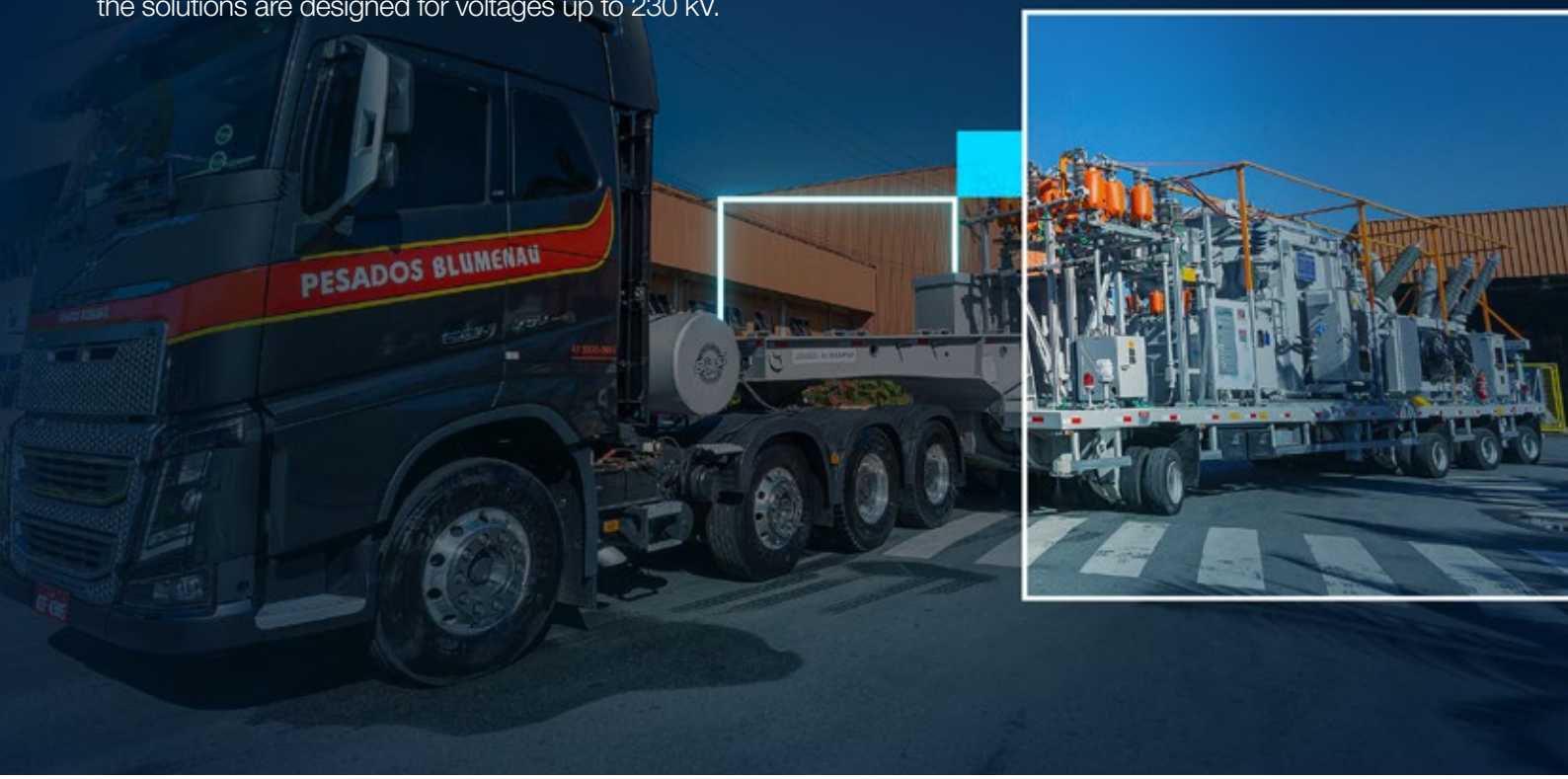
Step-up substations

They are located at the outputs of power generating units and they are intended to raise the voltage to transmission and sub-transmission levels, creating suitable conditions for the electricity flow to large consumer centers.

Execution plans are prepared with the principle of efficiency in the relationship with the customer and focused on quality and safety aspects during all project cycles.

Mobile solutions

WEG mobile solutions ensure operational flexibility with easy handling, installation and operation wherever needed. They are designed to restore energy quickly and safely, emergency care and preventive maintenance on power transformers and substations, allowing work to be carried out without energy supply interruptions. Built with the most modern components available, the solutions are designed for voltages up to 230 kV.



Applications

- Preventive and corrective maintenance
- Temporary demand increase
- Construction of industrial plants
- Expansion on existing substations

Benefits

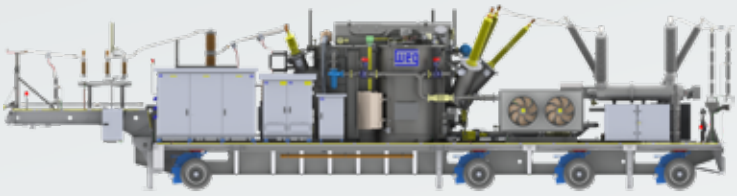
- Time reduction on shutdown emergency cases
- Complying with local transportation rules
- Easy to be connected with existing cabling arrangement
- Avoids extra investments with temporary substations

Processes

The electromechanical projects are made with state-of-the-art software. Fully 3D and complete electric designs, including communication architectures, logic and interconnection diagrams. Before shipping to the customer, severe driving and braking tests (transportation) are carried out on all mobile units, and after everything is ready, the solution is delivered together with the Mobile Unit Operations Manual, prepared specifically for each customer.

Mobile solutions available

- Complete mobile substations
- Mobile transformer
- Power supply input bay
- Mobile power supply up to 36 kV

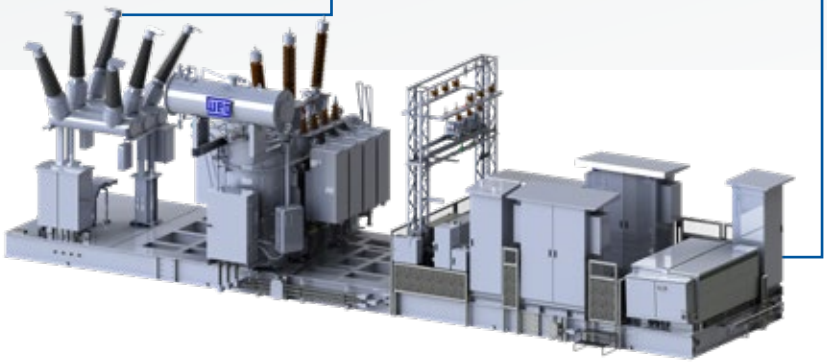


WEG mobile substations

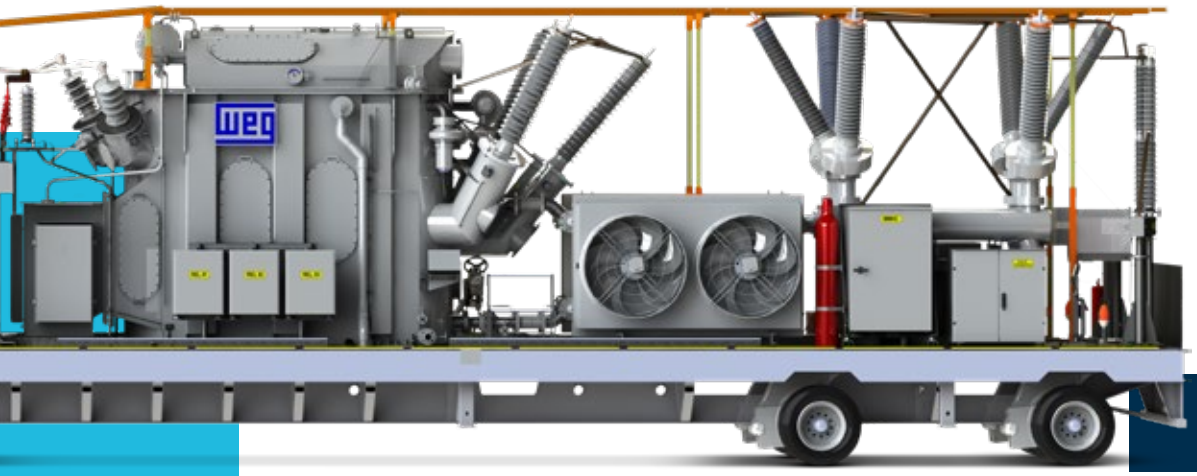
The mobile solutions manufactured by WEG are substations consisting of steel structures that use SKID base. They are compact with built-in equipment in a single platform, or they can be modular designed according to the project requirements.

HV solutions
up to 138 kV

With **MV outputs** up to 34.5 kV



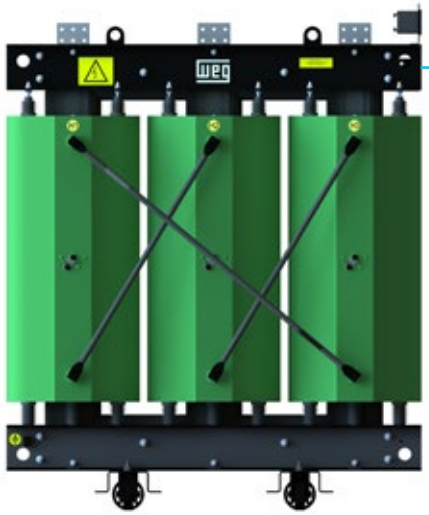
WEG mobile substations are complete solution with short lead times, for the implementation of substations for energy supply, ensuring safety and reliability for temporary or permanent applications.



High and medium voltage electric substations

Power transformers

Reduction in weight and dimensions, variety of insulating oils, extended service lifetime and monitoring systems are just some of the items evaluated by WEG's engineering team to develop oil transformers that offer a high level of performance to customers. The portfolio includes a complete line of distribution and power transformers up to 550 kV, insulated with mineral oil to reduce equipment costs or vegetable oil to significantly reduce environmental impacts.



Dry transformers

To meet demand for transformers that provide safety, space saving and reduce installation and maintenance costs, epoxy insulated transformers are always an interesting option. This product line provides features and benefits for different types of environments. Due to its VPI encapsulation process and the quality of the resin used, it mitigates partial discharges and a significantly increase the transformer lifetime. They are available in power ratings from up to 20,000 kVA, in voltage classes up to 36.2 kV and with degree of protection up to IP55.

Medium voltage panels

New compact lines for reduced space in Conventional Substations as well as in E-Houses, with all Switch Boards and MCCs manufactured and tested in accordance with current standards.

Designed for easy assembly and maintenance, and robustness to meet the mining segment requirements as well as allowing future expansions.

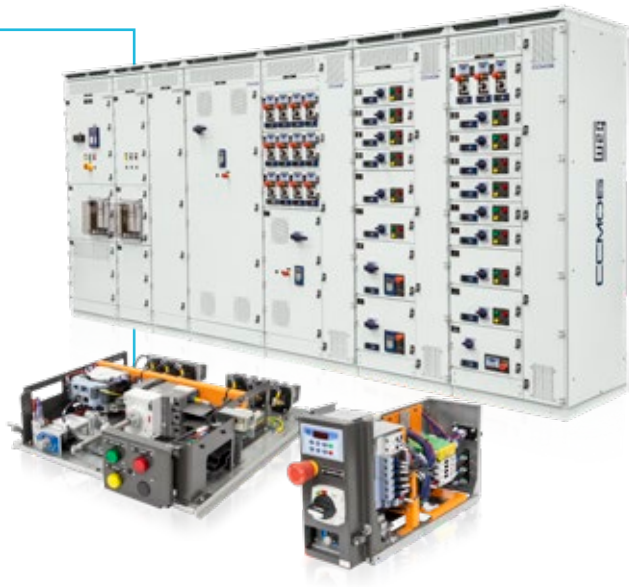
Safety systems, such as motorized extraction of circuit breakers/contactors, electric arc protection systems and online thermography, among other features are available on request.

Low voltage switch boards and MCCs

The new line of low voltage MCCs offers a multi-drawer solution for withdrawable systems, allowing a significant reduction of columns and reduced space, which is ideal for installations in existing substations and for e-houses.

Designed in compliance with international standards, and an optional version resistant to internal electric arc according to IEC 61641.

For Smart MCC version, all communication protocols are available.



Nobreaks and UPS

WEG solutions with uninterruptible electric power systems using high frequency converters provide high performance, maximum protection for your equipment and information as well as energy savings.

For AC systems, nobreaks are fitted with double conversion, eliminating impurities and correcting eventual electrical network disturbances in a safe way, keeping the operation even under power supply shutdowns.

For DC systems, the microprocessed digital rectifier counts on double energy conversion, in addition to fully digital microcontroller system, ensuring extended components lifetime.

Battery banks and several technologies are available, including valve-regulated sealed lead-acid batteries (VRLA), alkaline, gel, among others.

Mobile substations for open-pit and underground mines

Mobile substations for open-pit mines

- Mobile e-houses equipped with transformers (oil or dry type).
- Designed for outdoor applications, and for any transport conditions, including road transportation.
- Motor starter panels can be incorporated on SE Mobile.
- High degree of protection and special paint plan for all equipment.

SKID panels for dewatering pumps

- Drives: frequency drives and soft-starter (low voltage).
- Connectivity with other equipment installed in the plant, with wireless communication devices.
- Degree of protection suitable for outdoor installation: double door, extended ceiling and drag base.

Semi-mobile e-houses

- Hoists to lift and move the unit are not required, allowing the use of mechanical, hydraulic or pneumatic support devices.
- Installation directly on the ground, no solid base required.
- Integrated dry or oil transformer.
- Special WEG resistant coating for severe environments.
- Equipped with auxiliary systems (SCAI, CCTV, UPS, among others).
- Allow installation close to machines and driven loads, generating savings on field installations.

Mobile substations for underground mines

- Mobile e-houses equipped with transformers (oil or dry type).
- Designed for underground mines, since they are compact and allow easy handling.
- Start-up and control of fans and pumps.
- Protection degree of equipment for indoor or outdoor application.

Special motors and drives for underground mines exhausting systems

- Application for all types of fans (centrifugal and axial).
- Calculation of the need for air and ventilation according to NRM (mine regulatory standards).

Water supply and pumping systems

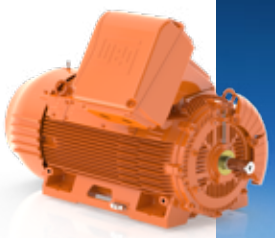
Efficiency and reliability on automation system for water supply

WEG provides solutions to control water supply, and pumping stations for mining projects with advanced technology incorporated for speed variation; compact solutions for protection against short circuit and overload conditions; reliability and precision for monitoring, operation and protection of electric motors.

With a team of qualified engineers and extensive market and projects experience, WEG is recognized and certified as a reliable manufacturer and supplier of variable speed drives, soft-starters, motor control centers, starters, motor circuit breakers and a wide range of motor control and protection products for pump applications.

Pumping stations

WEG solutions for pumping stations were developed to withstand the lowest to the highest temperatures, corrosive atmospheres and other tough conditions with a unique objective: reduce maintenance and improve the efficiency of pumping systems.



Low and high voltage W50 Mining motors

The W50 Mining motors are designed for industrial applications, ensuring high performance and reliability even under the most severe conditions.
This product meets the most demanding efficiency and safety criteria.

- The frame design guarantees high performance in mechanical strength and thermal dissipation, reducing motor vibration and extending lifetime.
- Unique fins distribution design ensures improved thermal performance.
- The internal air deflector and fan cover assembly system ensures low noise levels, meeting and exceeding the performance level defined by standards.
- High performance and robustness, with compact design.
- WISE® insulation for low voltage motors and VPI insulation for High Voltage motors increases stator electrical strength.
- The motor can be supplied with sleeve bearings, a wide range of accessories, modular fan kit, oversized connection box, among others.

Features

- Output power: 75 to 1,250 kW
- Rated speed: up to 5,000 rpm
- Frame size: 315 H/G up to 450 J/H
- Frequency: 50 Hz and 60 Hz
- Voltage: 380 up to 6,600 V
- Number of poles: 2 to 12
- Available according to NEMA or IEC

Rail car dumpers

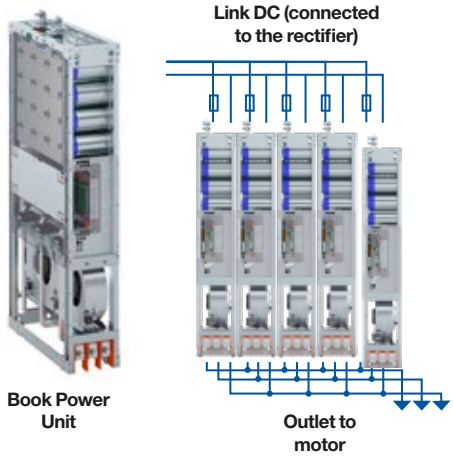
WEG provides complete solutions to drive rail car dumpers used in minerals and coal mines, grains and other products transportation, from variable speed drive systems, gearboxes to motors.

The system components are designed and manufactured considering heavy overload service duty, providing the customer with a customized package for each type of dumper – no matter if uniform compositions or diversified trains. Optionally, WEG can also supply the equipment and services to integrate the dumper's automation and control system.

Low voltage CFW11M G2 Modular Frequency Drive

The CFW11M G2 Modular Drive is a complete drive suitable for the severe service duties of car dumpers, controlling the motor in closed or open loop vector control.
Each power book is rated 600 HP and when combined can be available in power ratings up to 2,800 HP and voltages up to 690 V, operating in 6 or 12 pulse systems with static braking or in regenerative energy systems.

The modular concept allows configuration of the CFW11M G2 according to the output power required, with a book style mechanical design which a very compact solution. The control technology is the same as the CFW11 Line allowing all control and network communication, accessories, and features to the be same.



CFW11M G2 Modular Drive set up from 1 to 5 modules of 500 HP, totalizing up to 2,800 HP (larges power ratings on request).

Complete solutions

- Precise torque control and positioning on for positioning the dumper platen.
- High stopping resolution of the car dumper positioner.
- Energy regeneration to the electrical grid, during deceleration.
- High torque and dynamics when reversing motor direction of rotation.
- Continuous operation of the drive-motor set under heavy overload conditions.
- Supervision and control of equipment via communication network.
- Ease of maintenance with a simple and friendly interface for operation and diagnosis.

Induction – Squirrel cage – M Mining

Induction – Squirrel cage – W51HD Mining

Induction – Squirrel cage – W60

Induction – Squirrel cage – W22 Mining

Different motors to meet load and starting requirements

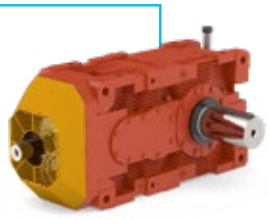
WEG offers several motor options to drive rail car dumpers in line with the specifications of each project. All motors are built with a Degree of Protection suitable to be operated at dusty or salty areas, besides meeting the most diverse service duties, considering the demand for power and torque for each car dumper position on all operating cycles. Motors with robust designs for extended service life and high technology for easier maintenance.

Applications on car dumpers (low and medium voltage systems)

- Car dumper positioner, with asynchronous or synchronous motor driven by frequency drive.
- Car dumpers operation with motors and geared motors driven by a frequency drive.
- Conveyors and Feeders, with several motors powered by low voltage MCCs.
- Integration to control systems, using intelligent relays and drives, controlled by SCADA.
- CFW11 and all control and network communication options are also available for the Modular line.

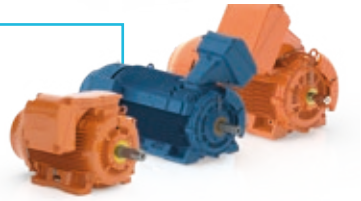
Gearboxes

Industrial gearboxes are compact, reliable and built with a modular design that allows their use in a wide range of applications in different market segments. The frames were designed to allow easier maintenance and provide better thermal dissipation and oil circulation, resulting in extended service lifetime for the related components. The gearing system has been specially designed to reduce the noise level and increase durability and efficiency.



Reliability

Associating the quality of WEG motors with the advantages of an innovative project, Mining Motors offer high resistance to impact, improved thermal dissipation and tough structure, ensuring long-lasting operation and reliability in applications at low (W22 Mining) and high voltage (W51HD Mining and W50 Mining).



Electrification and energy storage systems

Solutions for electric mobility on trains, mining trucks and vessels

The WEG propulsion system, consisting of a traction motor and drive, is a complete solution to handle large and heavy mining trucks.

The high efficiency traction drive, with reduced weight and volume, was specially designed to minimize the space required for its installation.

WEG equipment and solutions are designed in accordance with international technical standards and can be customized to meet each mining logistics system application.

Rectifying substations for trolley systems and for energy generation and storage systems

The rectifier substations are built with high performance power equipment, strengthness and reliability to provide DC electric power to supply power for mining equipment.

Mobility solutions can be applied, aiming at greater operational agility.

The ESSW is a complete electric energy storage and management system that can be set up to perform different functions ranging from reducing the intermittent duty of renewable generation sources to powering auxiliary services in power substations.

The energy control and management system manage the operation modes and optimizes its performance, ensuring higher efficiency and use of energy resources, in addition to providing operational flexibility and reliability of energy supply.

Coating

To meet different requirements in the processes of extracting, processing and transporting metals, WEG coating, meeting the different requirements of ISO 12944 standard, protect and prevent corrosion, reducing maintenance costs and reducing unplanned stops, which guarantees higher productivity.

Excess of dust and humidity

In the processes of extraction, crushing, screening, grinding and movement of ores and cement, excess dust is inherent, in addition, in many situations, the extraction of minerals takes place in very humid environments. In this way, coatings for machines, equipment, conveyor belts and metallic structures must be highly resistant, and be easy to apply.

WEG's dual function epoxy lines **(W-POXI ERD 322, WEGPOXI CVD 323 and WEGPOXI 89 PW)**, eventually combined with the polyurethane finish **WEGTHANE HPA 501**, fully meet these requirements, being ideal from construction to equipment maintenance.

Immersion and direct contact with liquids

During the beneficiation process, the use of separation techniques based on gravity, flotation or leaching exposes the equipment to contact with liquids, generating extremely aggressive situations. In other situations, pipes and metallic structures are buried or submerged in water, and this also deserves special attention.

The product lines **WEGPOXI WET SURFACE 88 HT, WEGPOXI WET SURFACE 89 PW, WEG TAR FREE 712 N 2851, WEG TAR FREE WT, WEG FENOXI, W-POXI BLOCK GFD 402** are formulated with the highest technologies in resins available and in compliance with the requirements of ISO 12944 standard, which guarantee excellent performance as internal and external coatings for painting pipes, storage and mixing tanks, cells and flotation columns, decanters, dewaters, thickeners, clarifiers and filters

W-POXI WFD 424 THERMOCROMIC PAINT

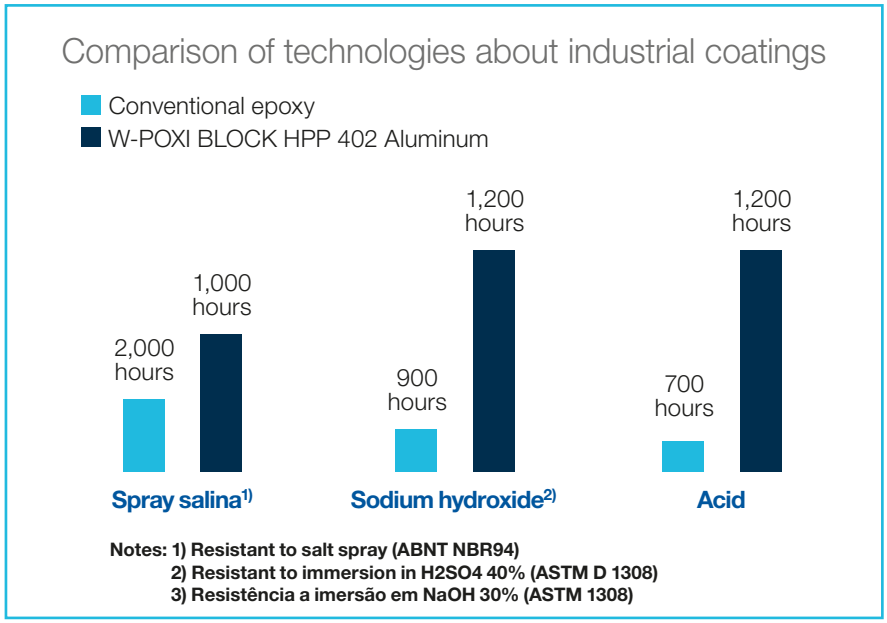
It is a thermochromic epoxy primer and finish with resistance to natural weathering superior to traditional epoxy paints. This ink has the characteristic of changing its color when there is a change in temperature. For example, if equipment overheats and it exceeds a temperature of 60 °C, the ink on this equipment will change color to orange and visually alert maintenance teams to possible problems, without the need for prior temperature measurement or equipment shutdown.

It has a high solids content and anticorrosive pigmentation, in addition to being two-component and having excellent adherence to carbon steel. A single coat is applicable in high thickness (from 150 to 300 micrometers), and in highly aggressive environments, the application of two coats is recommended. Its painting is recommended for painting metallic structures, tanks, piping and new machines and equipment or those undergoing maintenance in general, and especially for those places that need high temperature alert.

25 °C — 60 °C

Contact with chemical products

Some products and inputs from the processing units are corrosive, making equipment, tanks, piping and structures that remain in contact with these chemical agents need special protection. WEG also has lines of products specially developed to withstand these conditions, such as W-POXI BLOCK HPP 402 Aluminum, see graph on the side, which involve transportation and storage of fertilizers, inputs, acids and bases, mixing equipment and electrolytic extraction of minerals.



Resistant to high temperatures

WEG's product lines based on zinc and silicone ethyl silicate, **ETHYL ZINC SILICATE N 1661 and N 2231, W-TERM HPA 660 and W-TERM HPD 364**, have resistance to high temperatures, and are used in the painting of carbon steel equipment, such as parts of furnaces, process ducts, chimneys and equipment that operate at temperatures between 150 and 600 °C.

Specification for each application

Our teams are always on hand to evaluate and prepare suitable and customized painting specifications for each situation.

We consider the particularities of aggressive microenvironments, conditions of use and operation and cost-benefit ratio, thus obtaining the ideal painting system for each project.

Aggressive port, marine and industrial areas

Coastal regions for shipping or receiving material are constantly subject to salt spray and moisture, creating one of the worst corrosive environments. Factories and processing units located in regions with a high concentration of pollutants also provide highly aggressive conditions.

Therefore, for painting metal structures, car dumpers, loading and unloading facilities, ship loaders, reclaimers, cranes, forklifts, conveyor belts, silos and warehouses, WEG recommends and provides solutions in painting systems that can meet the demands of the ISO 12944 standard, such as zinc-rich paints, high-performance epoxies and finishes with polyurethane paints with excellent resistance to weathering, such as the **W-POXI ZSP 315 N 1277 lines, W-POXI ERP 322, WEGTHANE HPA 501**.

ELECTRIC ENERGY

Do you know how much you are not saving?

+90% of the electrical energy used in mines is consumed by electric motors. Did you know that?

That is why, every day, we develop solutions that provide more energy savings and increased productivity to mining through innovation, technology and knowledge of drive systems, from power supply, drives, motors, gearboxes to the most diverse applications, seeking the reduction of impacts on the environment and linking all this to awareness about the sustainable use of electricity.

Energy efficiency

Renergy saving

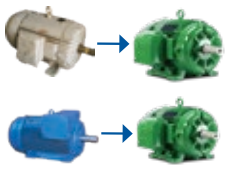
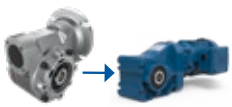
Reduction of carbon emmission

ESG and circular economy

To know more, **click here** and access

Find out how to become more efficient!

To become more efficient, it is essential to follow the evolution in the efficiency of equipment and systems, as there are new technologies to promote the reduction of electricity consumption, applicable in electric motors, reducers and frequency inverters.

	Action	Save and efficiency	Coverage	Other savings
	Replacement of motors Resizing of motors	Average 9%	71% of motors installed	■ Maintenance costs reduction ■ Improved power factor
	Processes automation	Up to 60%	57% of the processes	■ Quality improvement of products ■ Optimized consumption of supplies ■ Reduction of operational activities
	Replacement of gears	Average 35%	65% of gears installed	■ Maintenance costs reduction ■ Increased operational reliability and life

“What” and “how” to do: **WEG Solutions!**

To identify and implement a solution, WEG performs the following steps:

1 Identify opportunities

The main opportunities to save electric energy in mines are:

- Pumping Systems
- Conveyor Belts
- Crushers and Screens
- Ventilation Systems
- Compressors
- Bag filter
- Cooling Towers

To know more, **click here** and access

2 Analyze the information

See+ is a WEG software that makes it possible to simulate the application of more efficient motors to reduce energy consumption. The results show the estimated energy saving potential, necessary investment, financial indicators (Payback, NPV and IRR).

3 Implement the projects

Carry out the replacements and renovations proposed in the previous steps, obtaining the expected energy savings, CO_2 reduction and promoting the circular economy through reverse logistics of the equipment that was replaced.

For this, you can count on the WEG Exchange Plan, where the used motor of any brand is included as part of the payment for a new WEG motor.

To know more, **click here** and access

4 Energy and reliability management

To ensure that the installed solutions maintain gains in electrical energy and at the same time the availability of equipment, it is important to monitor these assets.

WEG Motor Specialist is a solution that uses artificial intelligence and machine learning to diagnose, monitor and indicate predictive maintenance and energy consumption in electric motors.

Service

24/7 taking care of your machine

Service and after sales support with the same quality of the WEG products

Commissioning and startup

Considering the magnitude of the projects and the complexity of the installed equipment, WEG offers specialized technical support for the installation, from start to end, from installation supervision to commissioning. Also included is the verification of equipment details and integration of the concept with the entire system.

Field services

WEG has a qualified and factory-trained team to carry out a series of activities on the field, minimizing execution times and the impact of costs and equipment handling.

- Assembly and installation
- Start up
- Alignment, balancing, bearings adjustments and machining
- Electro mechanic checking
- Baroscopic test
- Partial revision
- Complete revision
- Partial repairs
- Rewinding
- Recovery of generators and components
- Vibration analysis

Sypply of WEG replacement parts

After years in service, electric motors and generators need recovery to continue working properly.

For this recovery, it is advisable to use original parts supplied by the manufacturer. The WEG team is available for prompt service and to assist for correct identification of components.

Preventive maintenance/ Maintenance engineering

Verification and preparation of preventive plans according to maintenance concepts focused on reliability and adjustments according to the operating conditions of each plant.

Energy efficiency

Identification of potential reduction in energy consumption in electric motors, drives and power factor deviations, proposing solutions and defining the necessary retrofit. Results presented with individual return deadlines, making the decision flexible.

Recovery capacity limit

Definition through technical and economic criteria of the viability of repairing or replacing electric motors.

The work is carried out with the help of specific software, analyzing the data from each plant, allowing the cost analysis of the life cycle of the motors.

Service for gearboxes

For non-stop processes

Specialized in the manufacture of gearboxes and geared motors, WEG-CESTARI and TGM stand out for their experience and proven expertise in service and repowering of multi-brand gearboxes.

With modern machinery and equipment and a factory structure dedicated to providing services, WEG-CESTARI and TGM value quality and excellence in all their fields of activity.

Competitive advantages

- Corporate governance and financial strength
- Updated manufacturing site with state-of-the-art equipment
- Flexible and competitive structure
- Dedicated engineering for improvements
- WMS Management System
- ISO 9001 and ISO 14001 certifications


IA
WEGnology
IoT
MES

WEGdigital
SOLUTIONS

A new way to combine smart people, companies and products.

Based on its engineering expertise, WEG made available a new way of combining people, companies, software and intelligent products, resulting in a global solution that transforms energy into more reliable, efficient and intelligent solutions.

No matter your company size, we can help you:

Scalable and flexible solutions

- Easy to be implemented independently of the type of industry.
- Flexible solution designed for you.

WEG Expertise

- We have the ability to contribute to increasing the operational efficiency of our partners and reducing waste in different industry processes.

Co-working

- We support you to migrate from traditional industry into Industry 4.0.
- We share our technologies and experience to benefit your business.

Would you like to know more about WDi products and solutions?

- Plataform Wegnology
- WEG Smart Machine
- WEG Energy Management
- PC-Factory OEE
- PC-Factory MES
- PC-Factory IoT
- Intelligenceware Suite
- Advanced Pid Tuning
- Industrial Analytics
- B-Wise Historian
- B-Cloud
- Smart Public Lightning Management

To know more, click here and access

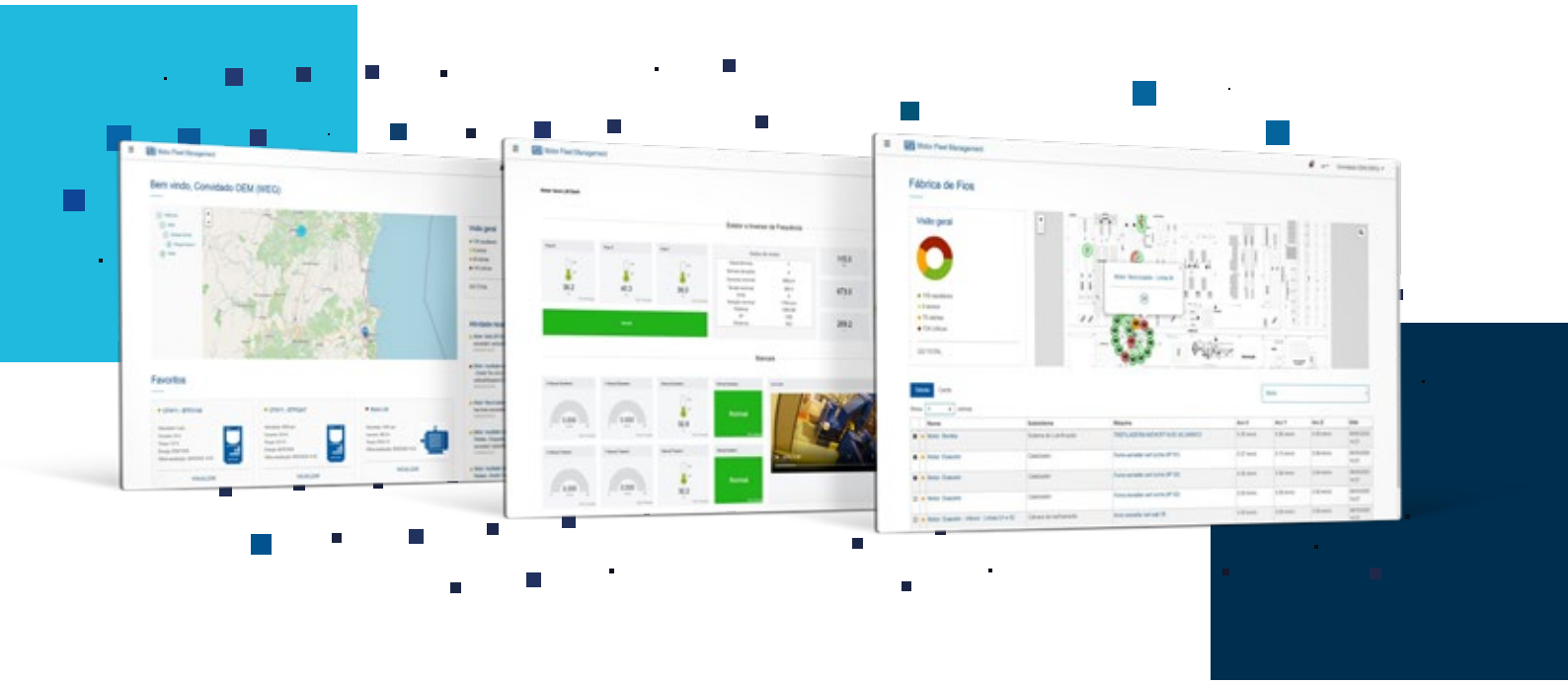
WEG Motion Fleet Management

Manage your driving fleet at real time

Designed to offer easy operation and agility for maintenance and management of industrial plants, WEG Motion Fleet Management is the ideal solution for monitoring your drive fleet. Based on “cloud computing”, asset monitoring can be achieved at any time and from anywhere in the world.

With WEG Motion Fleet Management, it is possible to know the operating status of different types of drives for low voltage motors (frequency drives, soft-starters and intelligent relays) and medium voltage (frequency drives and soft-starters), gearboxes, geared motors and other assets in any type of industry or installation.

Through the periodic collection of data, valuable insights are generated to maximize the performance and availability of the equipment fleet at the factory floor. Therefore, it is possible to determine and schedule predictive maintenance plans, significantly reducing the number of unexpected production stops.



WEG Motion Fleet Management is a modular solution, with a flexible structure based on layers, which adapts to customer needs.

With active subscriptions to the Management layer of WEG Motion Fleet Management, users will be able to complement their experiences by subscribing to specific modules such as WEG Specialist and WEG Exchange.

Assets and scans

WEG Motion Fleet Management allows online monitoring of low and medium voltage motors and drives, as well as gearboxes, geared motors, compressors, pumps and fans/exhaust fans.

WEG Scans and Gateways are hardware responsible for data collection and asset connectivity to the WEG cloud server, which hosts the WEG Motion Fleet Management application. For motor monitoring, WEG Motor Scan and Gateway are used, data can be uploaded via gateway or via smartphone. For low or medium voltage drives, data is sent via WEG Drive Scan.

Specialist modules

Specialist modules apply algorithms specially developed by WEG for advanced data analysis, through Machine Learning and Artificial Intelligence. These algorithms are applied to the data collected by WEG Motor Scans and thus generate useful information, something essential for efficient fleet management.

WEG Motor Specialist has a sub-module for diagnosing mechanical failures and another for evaluating the energy consumption of the motor. Both functionalities were developed by the team of WEG specialists and validated in the company's laboratories.

With WEG Drive Specialist, the user can analyze the cost of energy involved in the process and correlate the periods of operation with those of higher consumption. It is also possible to identify and solve problems related to the refrigeration system in advance, in addition to delivering insights on the power quality applied to the drives, then increasing the availability and reliability of the assets.

In reference to maintenance, the customer can do preventive checking on the drive. This preventive analysis algorithms observe and detect the patterns and deviations of operation of the monitored electric motor, generating indicators of failures due to imbalance, misalignment, bearing (advanced failure) and external vibration.

This type of information is very useful for the operation and maintenance team as it helps in decision-making, speeds up the repair process and minimizes unexpected downtime. To take advantage of the Specialist layer, it is necessary that the respective asset(s) have an active WEG Motion Fleet Management layer subscription. Both subscriptions are provided annually and per asset.

Computer vision with artificial intelligence

MVISIA Grupo WEG

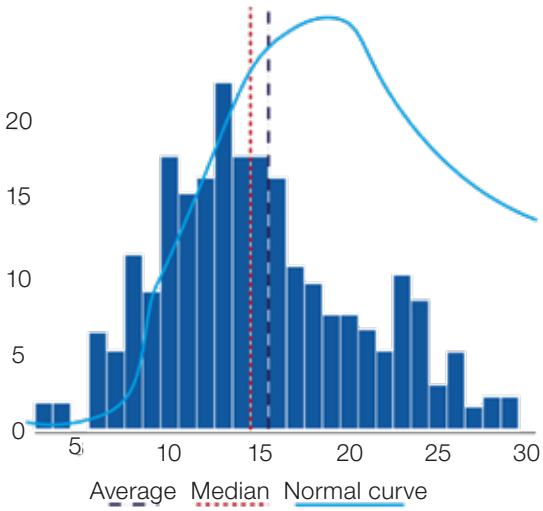
The ESOS intelligent vision system has the basic functionalities of an industrial PLC coupled to an industrial optical sensor, capable of processing Artificial Intelligence and Computer Vision algorithms in its high-performance processor.

Applications

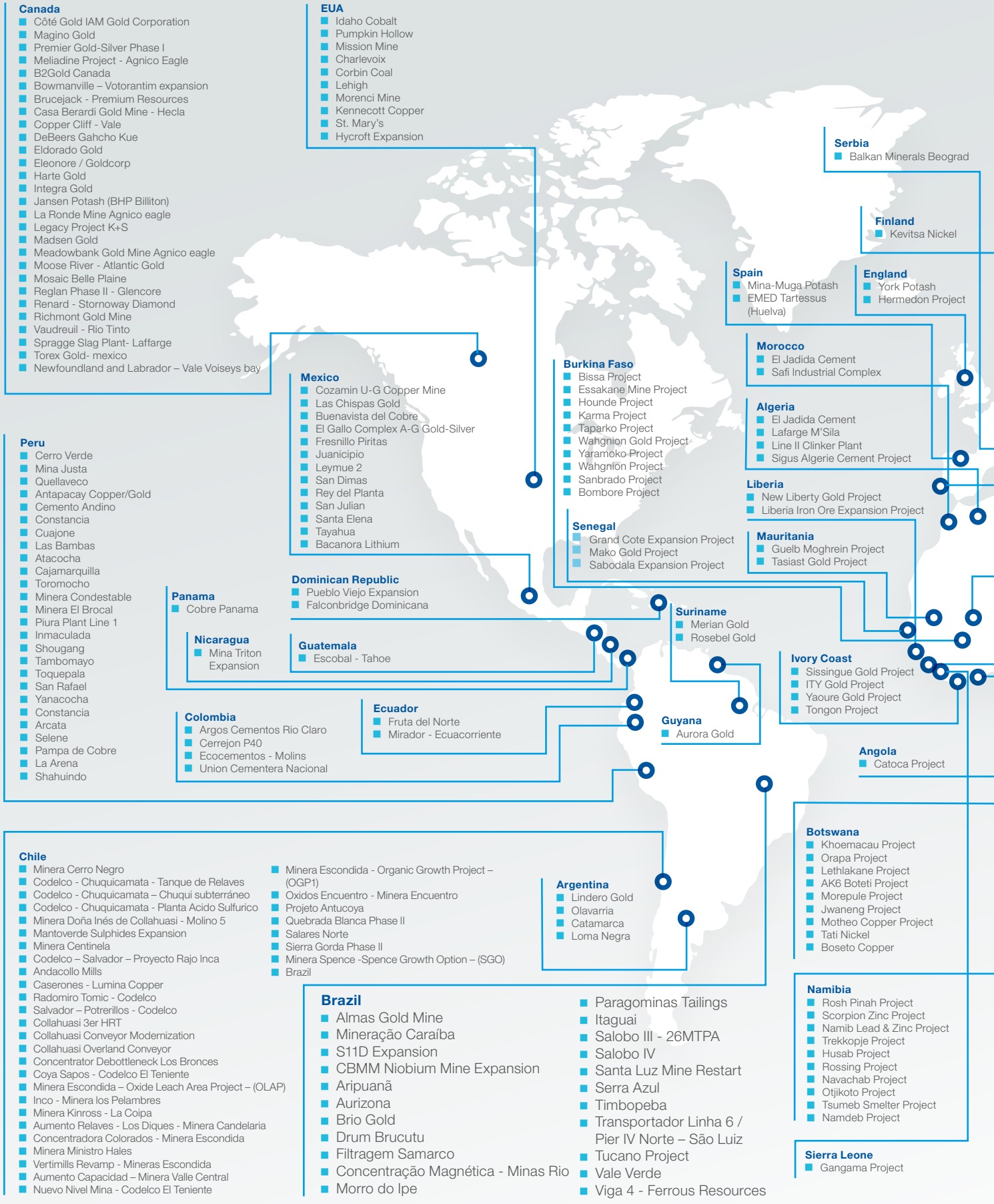
- Visual monitoring of the flotation process
- Online control of material granulometry
- Identification of non-crushable materials

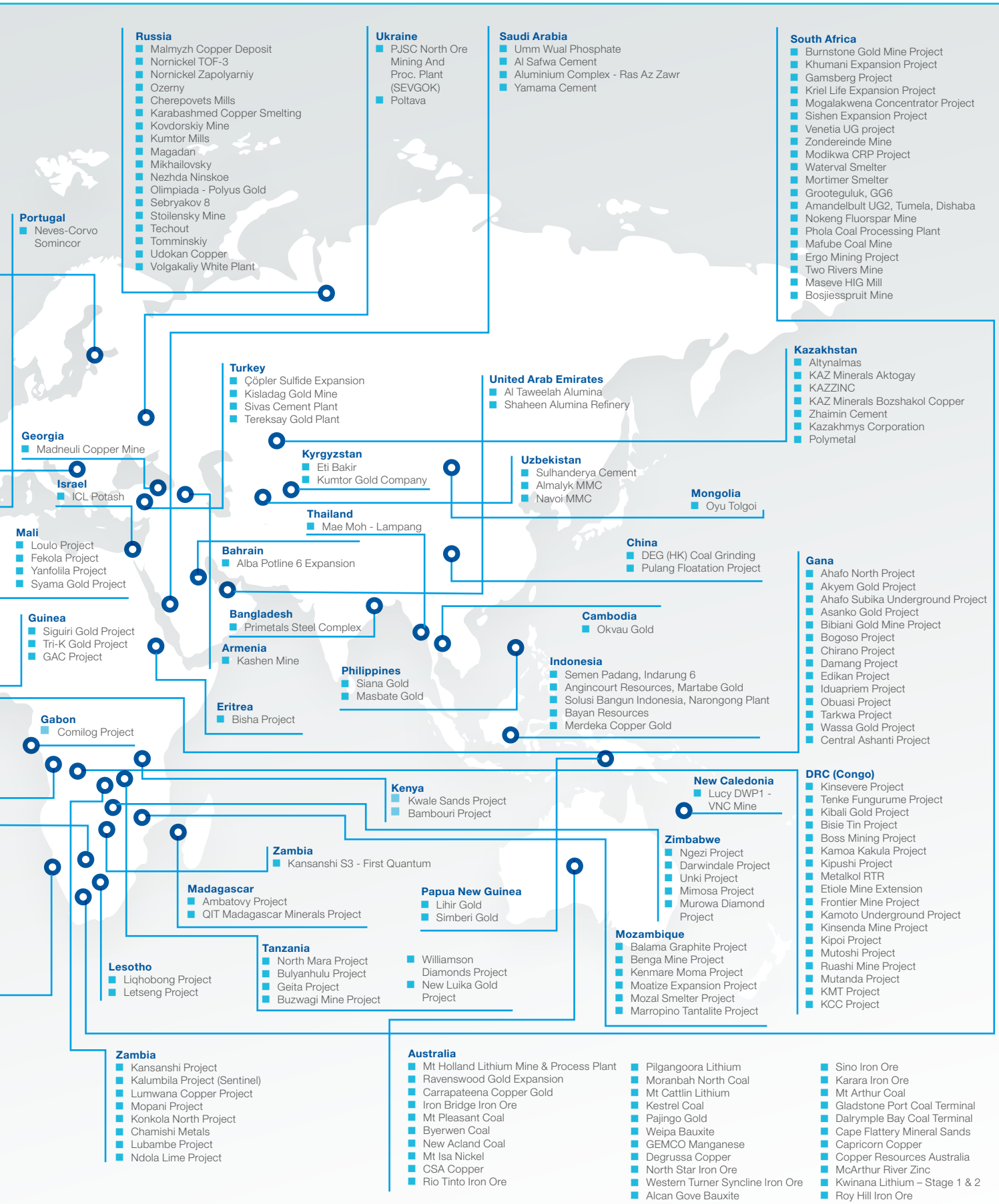
Main features

- Built-in digital inputs and outputs, plus RJ45 interface for industrial communication (Modbus-TCP/IP, Profinet, etc.)
- Possibility of integration with the main MES shop floor management software, feeding data into different types of industrial ERPs
- “All in One” concept for quick installations and setups
- System is programmable in the open language Python, having the main tools and libraries of computer vision and Artificial Intelligence already implemented
- Industrial equipment with Degree of Protection IP66



WEGINMINING




Russia
Malmyzh Copper Deposit
Nornickel TOF-3
Nornickel Zapolyarniy
Ozerny
Cherepovets Mills
Karabashmed Copper Smelting
Kovdorskiy Mine
Kumtor Mills
Magadan
Mikhailovsky
Nezhda Ninskoe
Olimpiada - Polyus Gold
Sebryakov 8
Stoilensky Mine
Techout
Tomminskiy
Udokan Copper
Volgakaliy White Plant
Ukraine
PJSC North Ore Mining And Proc. Plant (SEVGOK)
Poltava
Saudi Arabia
Umm Wual Phosphate
Al Safwa Cement
Aluminium Complex - Ras Az Zawr
Yamama Cement
South Africa
Burnstone Gold Mine Project
Khumani Expansion Project
Gamsberg Project
Kriel Life Expansion Project
Mogalakwena Concentrator Project
Sishen Expansion Project
Venetia UG project
Zondereinde Mine
Modikwa CRP Project
Waterval Smelter
Mortimer Smelter
Grooteguluk, GG6
Amandelbult UG2, Tumela, Dishaba
Nokeng Fluorspar Mine
Phola Coal Processing Plant
Mafube Coal Mine
Ergo Mining Project
Two Rivers Mine
Maseve HIG Mill
Bosjiesspruit Mine
Portugal
Neves-Corvo
Somincor
Kazakhstan
Altynalmas
KAZ Minerals Aktogay
KAZZINC
KAZ Minerals Bozshakol Copper
Zhaimin Cement
Kazakhmys Corporation
Polymetal
Turkey
Çöpler Sulfide Expansion
Kisladag Gold Mine
Sivas Cement Plant
Tereksay Gold Plant
United Arab Emirates
Al Taweelah Alumina
Shaheen Alumina Refinery
Georgia
Madneuli Copper Mine
Kyrgyzstan
Eti Bakir
Kumtor Gold Company
Uzbekistan
Sulhanderya Cement
Almalyk MMC
Navoi MMC
Israel
ICL Potash
Mongolia
Oyu Tolgoi
Thailand
Mae Moh - Lampang
Mali
Loulo Project
Fekola Project
Yanfolila Project
Syama Gold Project
Bahrain
Alba Potline 6 Expansion
China
DEG (HK) Coal Grinding
Pulang Floatation Project
Gana
Ahafo North Project
Akyem Gold Project
Ahafo Subika Underground Project
Asanko Gold Project
Bibiani Gold Mine Project
Bogoso Project
Chirano Project
Damang Project
Edikan Project
Iduapriem Project
Obuasi Project
Tarkwa Project
Wassa Gold Project
Central Ashanti Project
Guinea
Siguiri Gold Project
Tri-K Gold Project
GAC Project
Bangladesh
Primetals Steel Complex
Cambodia
Okvau Gold
Armenia
Kashen Mine
Philippines
Siana Gold
Masbate Gold
Indonesia
Semen Padang, Indarung 6
Angincourt Resources, Martabe Gold
Solusi Bangun Indonesia, Narongong Plant
Bayan Resources
Merdeka Copper Gold
Eritrea
Bisha Project
Gabon
Comilog Project
Kenya
Kwale Sands Project
Bambouri Project
New Caledonia
Lucy DWP1 - VNC Mine
DRC (Congo)
Kinsevere Project
Tenke Fungurume Project
Kibali Gold Project
Bisie Tin Project
Boss Mining Project
Kamoa Kakula Project
Kipushi Project
Metalkol RTR
Etiole Mine Extension
Frontier Mine Project
Kamoto Underground Project
Kinsenda Mine Project
Kipoi Project
Mutoshi Project
Ruashi Mine Project
Mutanda Project
KMT Project
KCC Project
Zambia
Kansanshi S3 - First Quantum
Zimbabwe
Ngezi Project
Darwindale Project
Unki Project
Mimosa Project
Murowa Diamond Project
Madagascar
Ambatovy Project
QIT Madagascar Minerals Project
Papua New Guinea
Lihir Gold
Simberi Gold
Mozambique
Balama Graphite Project
Benga Mine Project
Kenmare Moma Project
Moatize Expansion Project
Mozal Smelter Project
Marropino Tantalite Project
Tanzania
North Mara Project
Bulyanhulu Project
Geita Project
Buzwagi Mine Project
Williamson Diamonds Project
New Luika Gold Project
Lesotho
Liqhobong Project
Letseng Project
Zambia
Kansanshi Project
Kalumbila Project (Sentinel)
Lumwana Copper Project
Mopani Project
Konkola North Project
Chamishi Metals
Lubambe Project
Ndola Lime Project
Australia
Mt Holland Lithium Mine & Process Plant
Ravenswood Gold Expansion
Carrapateena Copper Gold
Iron Bridge Iron Ore
Mt Pleasant Coal
Byerwen Coal
New Acland Coal
Mt Isa Nickel
CSA Copper
Rio Tinto Iron Ore
Pilgangoora Lithium
Moranbah North Coal
Mt Cattlin Lithium
Kestrel Coal
Pajingo Gold
Weipa Bauxite
GEMCO Manganese
Degrussa Copper
North Star Iron Ore
Western Turner Syncline Iron Ore
Alcan Gove Bauxite
Sino Iron Ore
Karara Iron Ore
Mt Arthur Coal
Gladstone Port Coal Terminal
Dalrymple Bay Coal Terminal
Cape Flattery Mineral Sands
Capricorn Copper
Copper Resources Australia
McArthur River Zinc
Kwinana Lithium – Stage 1 & 2
Roy Hill Iron Ore

The scope of WEG Group solutions
is not limited to products and solutions
presented in this catalogue.
To see our portfolio, contact us.

For WEG's worldwide
operations visit our website

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