CEM Drive
System intelligence for vertical mills
Ingenious drive system

We achieved a new milestone in large vertical roller mills through systematic development and continuous improvement. This new product group excels in terms of: **reliability, efficiency and flexibility**.

Key benefits

- Less vibration due to optimised drive control
- Adaptable to the composition of varying material grades
- Able to accommodate different materials in the same mill
- Smooth operation and energy efficiency
- Easy handling and easy maintenance
- Soft start-up of the mill
- Infinitely variable speed
**Introduction**

With the novel, integrated and modular CEM (central electrical motor) Drive concept, we combine the benefits of the proven MAAG technology with an innovative motor design. The result is a state-of-the-art energy-saving drive system for vertical mills combined in one casing.

The modular design of the CEM Drive system permits a power range from 4,000 to 14,000 kW drive power, with the best possible availability levels. With the variable frequency converter energising the motor, this drive system allows optimised material grinding. The flexibility of the drive enables the production process to be optimised and actively controlled.

You get the CEM Drive system from one source and therefore an optimum adjusted drive system.

**New design**

The CEM gear stage is the proven PV stage (double planetary stage with torque split) of the well-known MAAG WPV gearbox. The motor and the planetary stage are in the same axis and directly coupled, thus eliminating the bevel gear stage used in conventional gearboxes. The planetary stage is fitted with smooth-running, maintenance-free sleeve bearings. This results in identical external dimensions compared to conventional gearboxes.

The CEM Drive is therefore an ideal solution for replacement and upgrading projects.

**Motor**

The heart of the CEM Drive is a permanent magnet synchronous motor with a loss-optimised single-tooth coil. The use of permanent magnets minimises resistive losses, in turn resulting in reduced energy costs. In combination with the frequency converter, the motor delivers constant torque over a wide range of speeds, with consistently high efficiency.

The integrated motor design brings the mill operator a host of cost benefits:

- No additional base needed, since there is no external motor
- The absence of an external main motor saves time-consuming alignment after commissioning, inspection or repair
- No auxiliary drive required for maintenance work

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**Selection chart for a vertical mill gear unit**

![Selection chart for a vertical mill gear unit](chart.png)
Oil unit
The gear unit is lubricated by a closed-circuit oil system. The oil tank serves as a platform on which all the assemblies and components, such as motor pumps (high and low pressure), switchable double oil filter, oil cooler and instrument panel, are installed.

Frequency converter
The VFC allows the mill speed to be continuously adjusted and therefore ideally matched to the specific grinding requirements of production. The smooth start up allows rotation at intermediate speeds to empty the mill table in a controlled way, in order to prevent overloading of the reject system, as well as slow turning and positioning of the mill for maintenance work.

The state-of-the-art drive control allows fine-tuning of speed and torque to reduce the overall vibration level and optimise the running behaviour of the mill for different operational conditions. The perfectly matched components minimise system perturbations.

Size and standard dimension (mm)

<table>
<thead>
<tr>
<th>Size</th>
<th>D</th>
<th>Output</th>
<th>H</th>
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<tbody>
<tr>
<td>CEM 3630</td>
<td>3,630</td>
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<tr>
<td>CEM 6000</td>
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The one time returns of CEM Drive System can be subdivided in the three groups below. Every involved component in a drive train undergoes these process steps. When analysing all listed process steps in detail and comparing them with the one source solution of CEM Drive, several savings can be evidenced.

**Engineering**
- Project management
  - Civil engineering
  - Mechanical engineering
  - Electrical engineering
  - Designmatch

**Sourcing & Logistics**
- Procurement
  - Supplier evaluation
  - Offer request & evaluation
  - P.O. issue
  - Expediting & quality control
- Logistics
  - Transportation

**Installation & Commissioning**
- Installation
  - Civil work
  - Handling on site
  - Installing
  - Aligning
  - Cabling
- Commissioning
  - FAT tests
  - Commissioning
  - Final adjustments

**Continuous returns**

**Function**
- Function improvements
  - Increased efficiency

**Process enhancements**
- Process
  - Increased availability
  - Improved process control thanks to variable drive and condition monitoring system

**Maintenance**
- Maintenance
  - Lower maintenance and spare part costs
  - No different lube and cooling oil required
  - Service & maintenance from one source

- Reduce your OPEX by 30%

- 50% savings on engineering
- 60% savings in sourcing & logistics
- 60% savings on installation & commissioning
- 22% less energy losses
- Save up to 13% on process enhancements
Precision is a question of quality

Our products are known for their high reliability. Manufactured in state-of-the-art production plants, enriched with many years of experience, supported by a wide range of services.

**Quality policy**

Our certification according to the latest ISO 9001:2008 standards and our commitment to create strong relationships with our customers, suppliers and employees has the clear target to establish us as a trustworthy, reliable and professional partner. This commitment includes providing the markets with high quality and high value solutions, products and services to support productivity and sustainability of our customer.

With our process management system, we endeavor to meet and exceed quality standards and provide adequate resources to support the quality system.

Our quality policy centers on the importance of meeting our customers’ requirements. To reach that our management continuously reviews and establishes the quality objectives and our employees are committed to the company’s Management System, as well to the continual improvement of the system and the entire organization. Each employee is aware of the vision and strategy we pursue and works in a culture of opportunity.

With our suppliers and external partners, we cultivate an open communication and collaborate on performance-oriented results.
As part of the global FLSmidth Group, the business continues to be the preferred full-service provider for the heavy-duty industry. As leading technical developer of drive solutions for the cement and minerals industries we remain focused on our customers productivity.

Engineering and production
Since introducing with great success in 1966 the technology of mill gear units to the cement industry we have sold over 6000 MAAG® gear units and 1000 girth gears. In today's setup, Engineering and Production take place in 4 modern plants located in Italy, Switzerland, Poland and India.

Our strength
We support our customer’s expectations with highly efficient products. The key of success lies in the combination of modularized solutions and compact design. Careful material selection and unique production accuracy enables our gear units to increase customers sustainability. The continuous incorporation of experience, new technical solutions and latest manufacturing techniques into the production process combined with intensive development and training of our engineers assure best understanding of how to design and operate a gear unit to lengthen its life cycle. A constant willingness to innovate and close collaborations with our customers have led to ensure that MAAG gear units operate reliably throughout the world under toughest conditions.

Product range
Today's product range includes various drive solutions and maintenance systems for all types of applications needed in various industries. We also manufacture single components such as bevel sets, girth gears and various replacement parts.

All MAAG gear units are available as standard solutions or customized to its specific application.

A pioneer of modern gear technology
For more than 100 years, the MAAG® Gear brand has successfully lived up to its founding vision and values.