

MAAG® GEAR
GEAR SYSTEMS

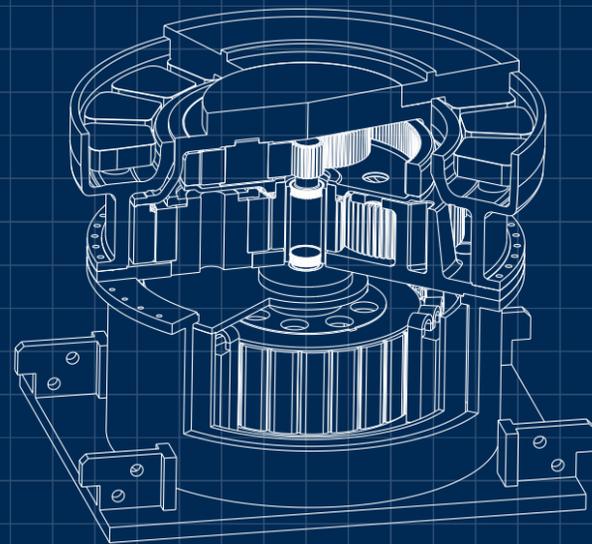
CEM Drive

More sustainable power
for vertical mills



A more sustainable drive solution

With sustainability at the forefront of cement manufacturers' minds, reducing power loss and increasing efficiency is a top priority. Through systematic development and continuous improvement, we are proud to offer the most sustainable drive system for large vertical roller mills, the CEM Drive. The smart design of this versatile mill drive system incorporates IoT technology to deliver the utmost efficiency, reliability and flexibility for VRMs from 4 000 – 14 000 kW.



Key benefits

■ Compact footprint

■ Easily adapts to different operating parameters

■ Reliable operation

■ Sustainable and efficient

■ IOT ready

Downsizing the footprint, upgrading the power with MAAG® CEM Drive gear unit

Introduction

The drive system is at the heart of every VRM. In that sense, the entire cement manufacturing process depends on it. So, above all things, it needs to be reliable. But with energy efficiency and CO2 reduction a core focus for all manufacturers, power consumption is also critical. The CEM Drive recognizes these twin priorities and achieves a perfect alignment between optimum efficiency and maximum performance.

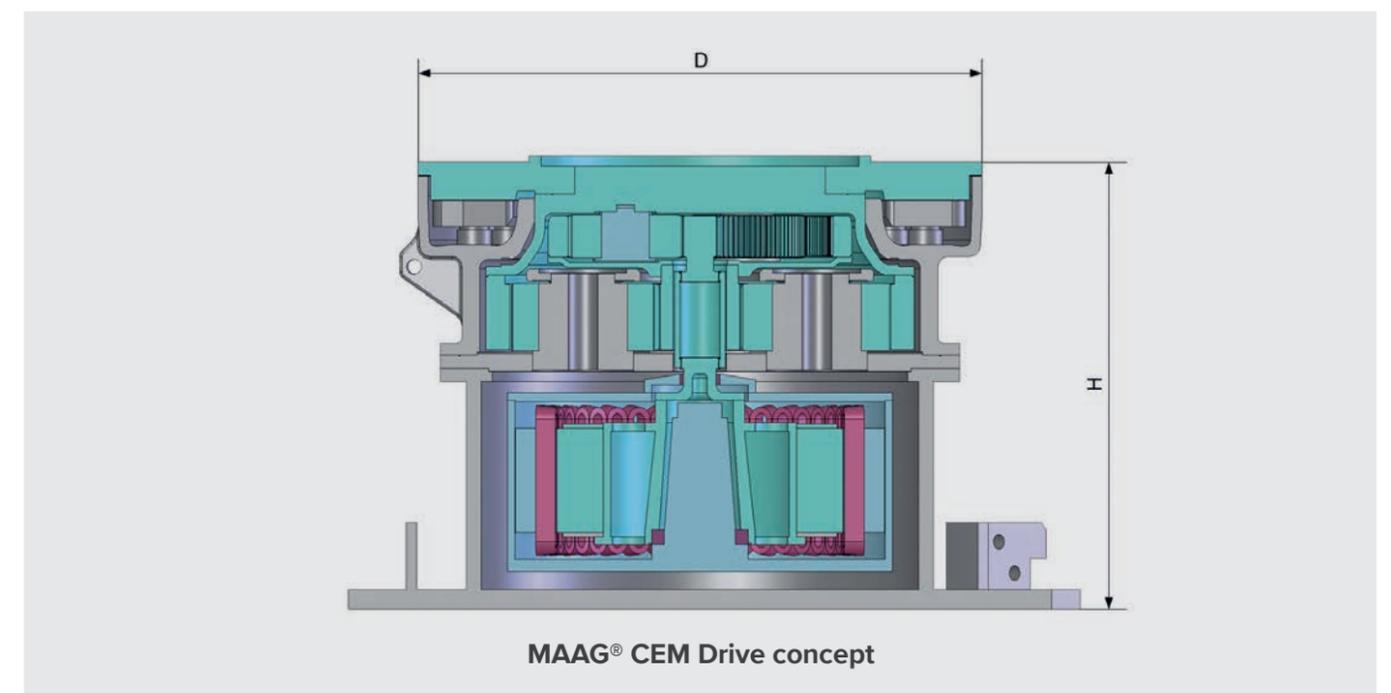
Efficiency-led design

This is made possible through the innovative and energy efficient motor design, which is at the centre of the drive – and through which the drive got its name, the Central Electrical Motor Drive. While many cement producers find themselves paying for energy that is wasted, and adding to their carbon footprint at the same time, the CEM Drive minimises power loss without compromising performance.

The motor, combined with the variable frequency converter, delivers a complete and energy efficient solution to power vertical roller mills with a drive power range up to 14 000 kW. Smart and flexible, it adapts to changes in your process, enabling you to actively control your operating parameters and optimise material grinding, all while reducing your environmental impact.

Compact footprint

The electric motor isn't just efficient, it is also compact. It sits underneath and is directly coupled to the planetary gear, replacing the bevel gear stage and enabling the CEM Drive to fit into vertical roller mills of all sizes with no need to accommodate an external motor. The drive size is determined by the dimensions of the mill table, while the planetary stage is fitted with smooth-running, maintenance-free sleeve bearings. This is one of the characteristics that makes the CEM Drive an ideal option for replacements and upgrade projects.



A low maintenance drive system with high availability, and high reliability

Reliable operation

To ensure the utmost reliability and availability, the CEM Drive utilises the same proven planetary gear technology as the well-known MAAG IronDrive gear series. This double planetary arrangement with torque split provides the highest torque transmission for VRMs.

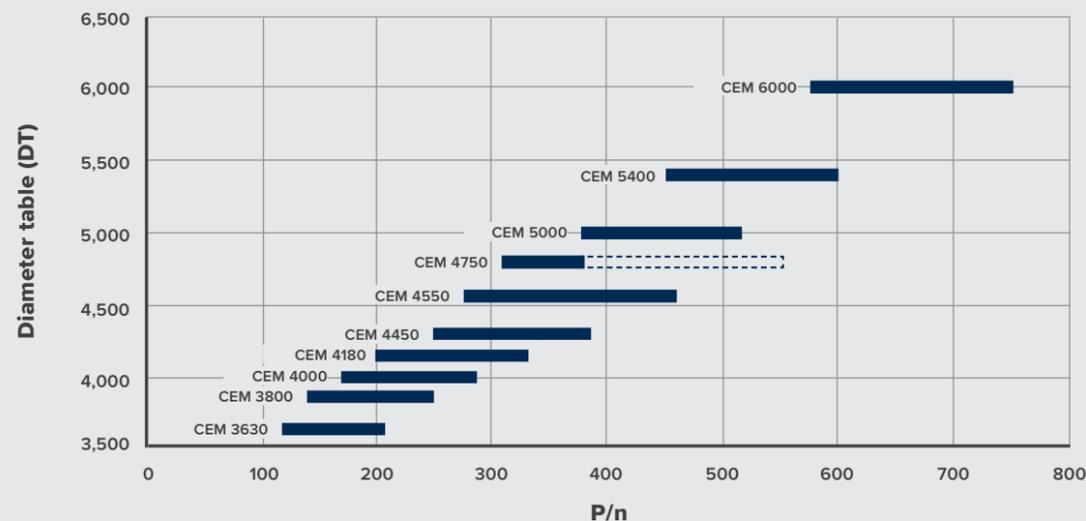
The integrated motor includes loss-optimised single-tooth coils and a wear-free self-exciting permanent magnet rotor. This means that you don't need any external excitation devices, immediately reducing both footprint and costs.

Embedded magnets concentrate the magnetic fields in the integrated motor, further contributing to the CEM Drive's space-saving and low-maintenance design.

Size and standard dimension (mm)

Size	D Output	H Total
CEM 3630	3,630	2,760
CEM 3800	3,800	2,880
CEM 4000	4,000	3,150
CEM 4180	4,180	3,130
CEM 4450	4,450	3,340
CEM 4550	4,550	3,475
CEM 4750	4,750	3,300
CEM 5000	5,000	3,350
CEM 5400	5,400	3,480
CEM 6000	6,000	On request

Selection chart for a vertical mill gear unit



More power to you

The heart of the CEM Drive is a wear-free, self-exciting permanent magnet synchronous motor with a loss-optimised single-tooth coil. The use of permanent magnets minimises resistive losses, giving you reduced energy costs. In combination with the frequency converter, the motor delivers constant torque over a wide speed range, with consistently high efficiency.

Oil unit

The large oil unit is designed as a closed loop circuit. It supplies oil to the thrust bearing to lubricate the planetary gear section and to cool the motor. The massive oil tank is designed to accommodate a multiple of the circulating flow rate, which gives the oil enough time to degas and cool down after each cycle. This ensures the high efficiency of the drive train is maintained.

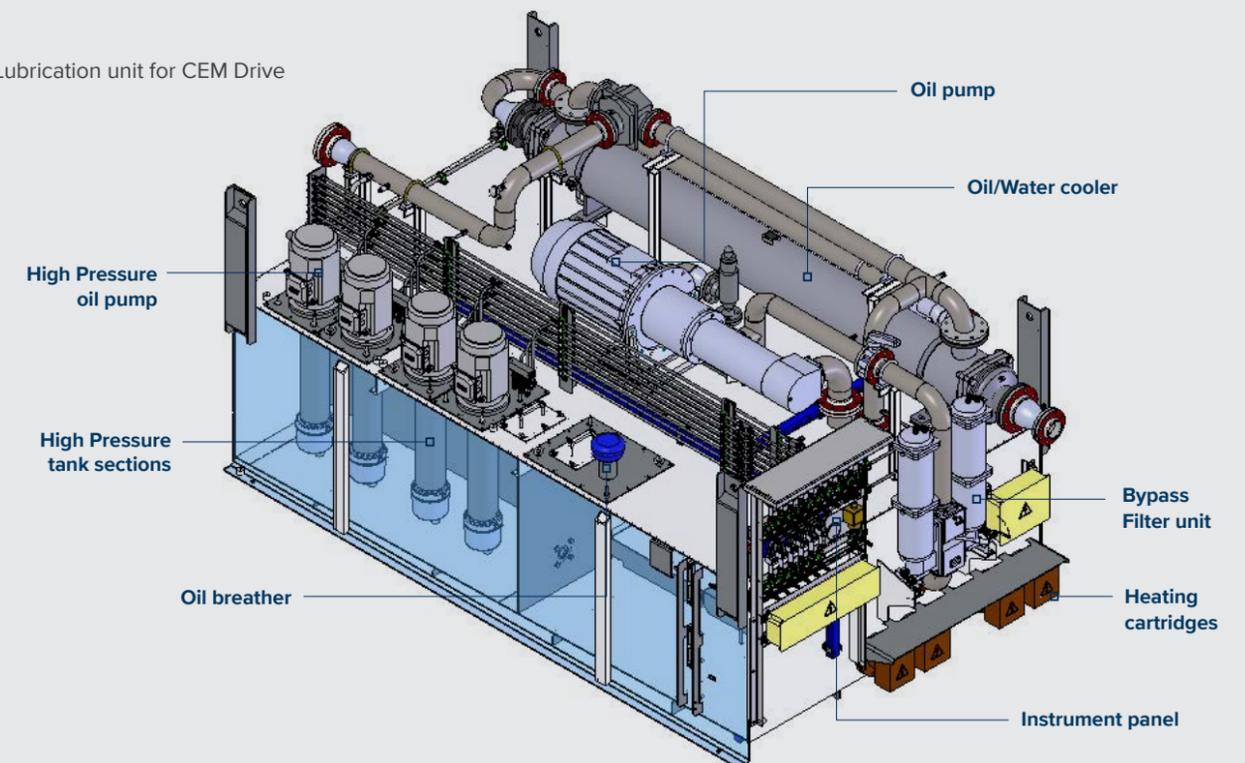
All the required components of the lube system, including motor pumps (high and low pressure), bypass filter, oil cooler and instrument panel, are installed on the lube unit.

Frequency converter

Thanks to the variable frequency converter, the mill speed can be continuously adjusted, giving you the ability to precisely match the mill speed to the grinding requirements at any given moment. With smooth start-up, the mill table can be emptied in a controlled manner, and thus overloading of the reject system is prevented. This slow rotation option also enables ideal positioning of the mill for maintenance work.

Because you have total control over the drive, you can fine-tune speed and torque to reduce the overall vibration level and optimise the running behaviour of the mill for different operational conditions. And of course, the components are all perfectly matched to minimise system perturbations.

Lubrication unit for CEM Drive



Online condition monitoring, optimise uptime and reduce costs

IOT ready - Beyond a basic condition monitoring system

All of our gear units are equipped with unparalleled condition monitoring sensors. Normally, these types of sensors keep an eye on critical operating parameters like bearing temperatures, casing vibrations, etc. and trigger a mill shutdown in the case of exceedances.

Digitalisation

Digital technologies enhance efficiency and ensure optimum performance in the long-term. However, to take your maintenance strategy from reactive to proactive, our online condition monitoring services use continuous monitoring and data analysis to detect wear and tear at an early stage. This enhanced information, combined with our Service Agreements, enables you to plan maintenance and servicing in advance, reducing downtime and keeping your plant running smoothly.



Streamlined engineering and lasting efficiency

The CEM Drive offers both one-time returns and ongoing value compared to other drive systems. A comparison of the engineering, sourcing and logistics, and installation and commissioning costs reveals a significant saving on a new CEM Drive system whether for a new line or upgrade project. Meanwhile, the energy efficiency, process enhancements and reduced ongoing maintenance costs also deliver impressive savings, as outlined below.



FLSMIDTH

Mission Zero

TOWARDS ZERO EMISSIONS IN CEMENT



**Zero
emissions**



**100% fuel
substitution**



**Zero
waste**

FLSmidth A/S
Vigerslev Allé 77
2500 Valby
Denmark

Tel. +45 3618 1000
Fax +45 3630 1820
info@flsmidth.com

www.flsmidth.com

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