SYMETRO™ gear unit
Spare parts and accessories
Made to last, our MAAG® SYMETRO™ gear unit – manufactured since 1926 – operates at close to 99% efficiency while providing exceptional reliability and cost-efficiency for your ball mill. Rotating parts using TSHH technology bring your gear unit back to life – and deliver durability long into the future.

Key benefits

- Dependable and easy to maintain for best availability
- Rotating parts that bring your gear units back to life at the best price
- Upgrade worn-out gear units quickly, with no civil engineering
Made to last
High efficiency, long life and little maintenance make our SYMETRO™ gear unit the ideal central drive solution for your ball mills. Around the world, more than 1,000 gear units are in operation, some of them since more than eighty years. Spare parts for all gear units supplied since 1926 are still available based on our comprehensive documentation files. The Symetro gear unit is reliable and cost-efficient.

Spare parts and accessories
Nothing lasts forever, and spares will be required during the life time. In this brochure you will find details on the general spare parts. To support the rotating parts for increased reliability, we developed a portfolio of accessories. These will ensure that your gear installation can be fully equipped with all modern surveillance and lubrication facilities. Please contact us for more specific product information.

We also offer inspection, supervision, installation and training services. For more information, please request separate brochures on these matters.

Standard spare parts

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Our Symetro gear units and rotating parts are manufactured and tested in our modern facility in Elblag, Poland.
1. Casing, bottom frame
2. High speed (HS) pinion
3. Intermediate wheels
4. Intermediate pinions
5. Low speed (LS) / Balance wheel
6. Output shaft / Torsion shaft
7. Guide rings
8. High speed bearing housing and roller bearings
9. Intermediate bearing housing and roller bearings
10. Bolts for intermediate bearing housings
11. Balance bearings (radial/axial)
12. Plate springs
13. High speed coupling
14. Membrane coupling, mill side
Complete gear unit

Drawing its name from the symmetrical torque split within the gearbox, the MAAG® SYMETRO™ is a two-stage gear central drive unit for ball mills with incredible durability providing unparalleled availability to your ball mill for decades.

Our Symetro gear is a split torque central drive unit for ball mills. It transfers the torque and speed from the mill motor to rotate the ball mill.

We supply new Symetro gear units with TSHH technology ensuring significant improvements compared to old Symetro gear units.

\[ T \text{ = Transmission} \]
\[ S \text{ = Symetro} \]
\[ H \text{ = Case-hardened HS pinion} \]
\[ H \text{ = Case-hardened intermediate pinions} \]

With the TSHH technology we ensure that all teeth are ground on both pinions and wheels and that all pinions are delivered case-hardened and all wheels through-hardened up to HB 360. Helix flank correction of the high speed pinions provides optimal tooth contact under load which ensures long lasting parts and improves both operation and maintenance. We deliver Symetro gear unit complete with input pinion and torsion shaft with membrane plates, ready to run at full capacity immediately after installation.
The rotating parts for the Symetro gear unit with TSHH technology consist of all the movable parts inside the gear box with exception of the output coupling and the torsion shaft. The function of the rotating parts is to transfer the speed and torque from the motor, to the ball mill.

The TSHH technology – referring to case hardened HS and intermediate pinions - can be provided for all existing Symetro gear units regardless of capacity size or type. Installation is complete within 2 weeks and the Symetro gear unit and ball mill will be ready for operation with 100 percent load immediately thereafter.

**Scope of supply**
- Case-hardened high speed pinion complete with bearings
- Two intermediate gear wheels shrink fitted on case-hardened low speed pinions with bearings
- New guide rings
- Balance wheel with side plates
- Alignment tools

Boost your existing SYMETRO™ gear unit with TSHH technology
Plug and Play solution. The state-of-the-art rotating parts fits perfectly into your current gear casing enabling productivity enhancement of your ball mill.
High speed (HS) pinion
The high speed pinion for the SYMETRO™ gear unit consists of an input shaft with either an integrated or a shrink fitted pinion. The high speed pinion has case-hardened tooth surfaces and helix flank correction to ensure durability. All bearings are mounted before delivery to ensure easy installation. We recommend that the high speed pinion is purchased as a kit including roller bearings and labyrinth seals to avoid missing parts for installation in case existing bearings and seals are not reusable.

Guide rings (fixed)
The guide rings are mounted on the intermediate pinions between the double helical toothing and restrict the horizontal movement of the balance wheel thereby avoiding temporary backlash reduction. The guide rings act as progressive springs and serve to keep the balance wheel in a horizontal position. In case of heavily worn tooth flanks in the low speed set, we recommend fixed guide rings bolted together around the intermediate pinion as a temporary solution. All guide rings are tailor-made for the specific gear unit to ensure a perfect fit.

Bearings
All pinions are mounted in spherical roller bearings. Spherical roller bearings ensure low friction which decreases wear during operation and obtains axial thrust and minor shaft deviation.

Balance/output wheel with integrated side plates
The balance wheel of the gear unit is connected to the torsion shaft through a membrane coupling bolted to the hub. The balance wheel features several improvements such as increased hardness (HB 325-260) and improved quality of the wheel teeth and improved surface roughness of the teeth. For Symetro gear units with TSHH technology the balance wheel can be delivered as an individual part. For old Symetro gear units with through-hardened intermediate pinions, the single balance spare wheel is only a temporary emergency solution with a short expected life time.
Complete membrane coupling – high speed end
The high speed torsion shaft of the membrane coupling connects the mill motor to the SYMETRO™ gear high speed shaft. It consists of a short shaft fixed to two hubs with flexible membrane plates. The flexibility in the membrane plates is superior for transferring torque even under shaft angle deviation. In the high speed end the membrane coupling can be fitted to a TTVF barring gear unit through a special engagement piece.

Membrane kit - balance wheel/mill side
The membrane plates transfer the torque from the balance wheel to the mill allowing minor shaft angle deviation. The kit consists of 8-13 steel plates of 2-3 mm thickness, bolts and mounting tools. The plates have laser welded joints and are stacked with the joints 90° offset and pre-drilled in one piece. The plate size differs from the balance wheel side and mill side why the location must be specified.

Complete membrane coupling with torsion shaft – low speed end
The complete membrane coupling with torsion shaft for the low speed end consist of membrane plates which are fixed to hubs with tight fitting bolts. The hubs are mounted on to the torsion shaft with shrink fitted dowel pins. The balance wheel side is fixed to the balance wheel while the mill side is fixed to the trunnion. Each membrane coupling consists of 8 to 13 steel plates of 2-3 mm thickness which are stacked and drilled in one piece. The flexibility of the plates makes them superior for transferring torque even under shaft angle deviation. The membrane plates have laser welded joints to secure the stability of the plates. The dimension of the membrane plates differs from the balance wheel side to mill side.

Torsion shaft with bearing ring
The torsion shaft with bearing ring is the output shaft of the gear unit which transfers the torque to the mill. It functions as an absorber for torsional vibrations. The torsion shaft can be supplied as a single part or as a kit including the hubs and membrane plates.
Accessories

A portfolio of units and devices has been developed in order improve the SYMETRO™ gear unit's performance both in terms of safety, lifetime and reliability during operation. The accessories can be retrofitted to all existing units.

Transparent bearing covers
The 6 transparent bearing covers makes it possible to inspect the oil overflow of the intermediate roller bearings during mill operation. The bearing covers are made from plexiglass and is well suited for application in harsh environments. The transparent bearing covers are standard for new Symetro gear units.

PT 100 sensor
For old gear units without temperature sensors in the high speed bearing housing and oil sump it is highly recommended to retrofit new PT100 sensors incl. transmitters.

PT 100 sensor and metal chip switch
The water saturation sensor and metal chip switch is an integrated part of the lubrication system A/A-D/D, however it can also be installed in any oil pump system. The water saturation sensor is typically installed right after the oil cooler and the metal chip switch is installed in the return line.

Seal kits
The gear unit must be kept sealed in order to minimise oil spillage and contamination. A complete seal kit consists of sealing devices for all flange joints and shafts.
The TTVF-H barring device is located between the mill motor and the Symetro gear unit and will be connected through the high speed membrane coupling with a manual engagement device. The TTVF-H barring device will turn the mill with approximately 2% of operation speed and can lock the mill into desired position during service and maintenance. Additionally, the barring device ensures that the main motor does not need to be stopped or started during maintenance.

VIBGUARD®

Vibguard Compact includes 6 high frequency measurement channels for vibration and other dynamic signals. This compact monitoring and diagnostic system runs with an independent processing unit and controls the programmed measurement tasks autonomously. A permanent PC connection is not required. As an intelligent diagnostic robot, it detects different operating states of the ball mill and independently adapts the recording and evaluation of the measured data to these states. Notification are provided when operating parameters like vibrations or temperatures are exceeding acceptable values and data and analysis are send periodically to the diagnostic centre.

Level switch

The level switch is located in the oil tray on top of the gear box in order to monitor the oil level for the wheels. If the oil level decrease to a point where the wheels are not properly lubricated it could cause severe damage. The level switch ensures a substantial oil level and thereby secures a proper oil film in the mesh and bearings. It substitutes the obsolete and mechanical mercury switch or Jo bell switch which are both complex to adjust and easily becomes unreliable. As a substitute for the old mercury switch the new level switch is delivered with an adaptor for direct and easy fitting.

Lubrication unit A/A-D/D

The lubrication unit A/A – D/D can be retrofitted to any SYMETRO™ gear unit and will improve the cooling and filtration of the oil for the gear unit even under tough operation conditions i.e. in hot and dusty environments. The improvements of the lubrication unit can lead to increased life time of the teeth and roller bearings and the unit is uniquely designed to fit all versions and sizes of the Symetro gear unit. The lubrication unit is equipped with a water saturation sensor and a metal chip switch.

TTVF-H barring device

The TTVF-H barring device is located between the mill motor and the Symetro gear unit and will be connected through the high speed membrane coupling with a manual engagement device. The TTVF-H barring device will turn the mill with approximately 2% of operation speed and can lock the mill into desired position during service and maintenance. Additionally, the barring device ensures that the main motor does not need to be stopped or started during maintenance.
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.

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 todays’ 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
Todays’ 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.