High Torque Planetary Gears PBLZ
for Ball Mill Central Drives
Well proven epicyclic gear technology

RENK epicyclic gears are used e.g. in central ball mill drives since 1974 when RENK has supplied the first epicyclic gear for a 2.5 MW ball mill featuring 2 planetary stages each with three planets. The epicyclic gear technology has been the step to take as the powers of the mill systems increased steadily. With new materials, manufacturing technologies, improved lube oils and last but not least condition monitoring technologies, the RENK central drives were improved to their third generation on the market named PBLZ type.

Development of the drive technology for ball mill central drives within 50 years: 4 MW drive for a 15.6 rpm mill. At the same time increasing the AGMA service factor from 2 to 2.5. The weight is the system weight including couplings.

The Drive System Design
Complete package of equipment

2. Main Motor: 3000 – 16000 kW; 750 – 1500 rpm
3. Main Gear / Coupling: 14 – 18 rpm
4. Cement Mill
5. Oil System, optional with SCS Controller
Large Horizontal Drives

Mill Stop
The mill swings to stop after a motor stop. This requires backward rotation.

<table>
<thead>
<tr>
<th>Nominal speed</th>
<th>Aux drive speed</th>
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<tbody>
<tr>
<td>Start operation</td>
<td>Max. kinetic Energy</td>
</tr>
<tr>
<td>30 to 60 sec.</td>
<td>Max. potential Energy</td>
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RENK Auxilliary Drive System

**Features**

1. **Claw Clutch**: engaged until overruning takes place; manual disengagement only after balancing.
2. **Auxiliary Gear**: reducer
3. **Drum Brake**: opening electrically only with interlock to oil pressure
4. **Hydraulic Clutch**: clutch works as a dynamic brake for balancing the mill in controlled manner
5. **Auxiliary Motor**: equipped with backstop – can not turn reversly

**Mill Stop**
The mill swings to stop after a motor stop. This requires backward rotation.
Safety and Dependability Are on Top of the List

RENK will provide all components of the drive system! The condition of all elements is continuously monitored by sensors and switches.

A logic diagram provided to configure a Programmable Logic Controller (PLC) or a readily programmed Sub Control System (reporting to the main PLC) is available. The RENK programmed and tested SCS shortens the commissioning time and reduces the risk of site work mistakes.

In any case the operation is safe and interlocked against faulty operation.

The OI System features a hot standby pump, a double switch filter system with remote clogging indicator and a temperature control valve to provide constant operation conditions also at changing cooling media. The oil quantity born in the tank is rated generously to allow an extended running time without oil change. The oil is continuously fine filtered to minimise the impact on the gear elements by abrasives which cannot be prevented to penetrate the oil circuit in the cement plant environment.

In addition to all those elements an emergency oil tank is provided to make sure the shaft system can coast down safely in case of frequent black outs or a delay in stopping the main motor in case of a major failure of the system. Two minutes of operation are possible without power source.

The backstop on the auxiliary drive motor turns the hydraulic clutch into a retarder for controlled ballancing – brake is opened electrically and is interlocked with oil pressure for gear.

The Oil System Features

1. Local Instruments: optional SCC
2. Water Cooler: optional air
3. Stand by Pump: no stop for pump failure
4. Main Line Filter: 40 μm cleanable, stainless steel
5. Pysa Filter: 10 μm non cleanable, fleece
6. Tank: approx 5 times pump cap
7. Heating: 21 kW
Large Horizontal Drives

Our Gear Lifetime Makes Your Money

- 3-stage design for compactness and safety.
- Moderate bearing loads to provide safety margin.
- Hydrodynamic sleeve bearings are selected for ultimate lifetimes.

The lifetime of sleeve bearings is mainly subject to proper lubrication! In case white metal bearings are wiped out repair is possible.

PBLZ Ball mill drives feature all over hydrodynamic sleeve bearings. The bearings of the two planetary stages feature brass surfaces to be most resistant against any adverse operation condition. The brass bearing metal provides a higher strength than usual white metal spindles.

Gears are case hardened (except annulus) and precision machined. The casing is cast from cold climate enabled globular cast iron. Fine filtration minimizes wear of gears and bearings.

Before we supply our gears we carefully assemble them by skilled hands and test the complete system on our test bed.
Condition Monitoring and Service Completes the Package

Long life time is the result of good equipment and proper maintenance. The RENK Service group is not only present for installation and troubleshooting but can assist on a regular basis in the frame of a maintenance contract.

Such assistance includes the judgement of the outputs from the condition monitoring system which is supplied with the equipment. With such results preventive maintenance can be planned well aimed.

The RENK PBLZ Central Drive at a Glance

Questions to ask before you decide

The following has been found to be advantages of RENK central drives:

<table>
<thead>
<tr>
<th>Feature – RENK has it!</th>
<th>Why do you need this?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planetary design (low speed stages)</td>
<td>High torque Parallel shaft gears and to deflect under torque affecting the load pattern and are ultimately heavy</td>
</tr>
<tr>
<td>3-stage design with compact dimensions</td>
<td>Compact parts means to save parts cost. Ratio can go up to 100 with no problem – i.e. 4-pole standard motors can be used</td>
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<tr>
<td>Best quality materials and QA made in Germany</td>
<td>Cleanliness for increased lifetime of the components especially in abrasive atmospheres; hot LP pump for uncompromising availability; oil viscosity optimization for oil pump power saving.</td>
</tr>
<tr>
<td>Hot stand by pump, bypass cleaning, temperature control valve</td>
<td>ISO4406 20/17/14 cleanliness increases lifetime; hot LP pump for uncompromised availability; oil viscosity optimization</td>
</tr>
<tr>
<td>High margin and no restricted lifetime elements</td>
<td>All sleeve bearing design; AGMA Sa &gt; 2.5; ISO6336 Ksa &gt; 1.6 &amp; Sfu &gt; 2.0;</td>
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<tr>
<td>Temperature, Vibration and Mill Axial Position</td>
<td>Condition monitoring for preventive maintenance and proactive maintenance</td>
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