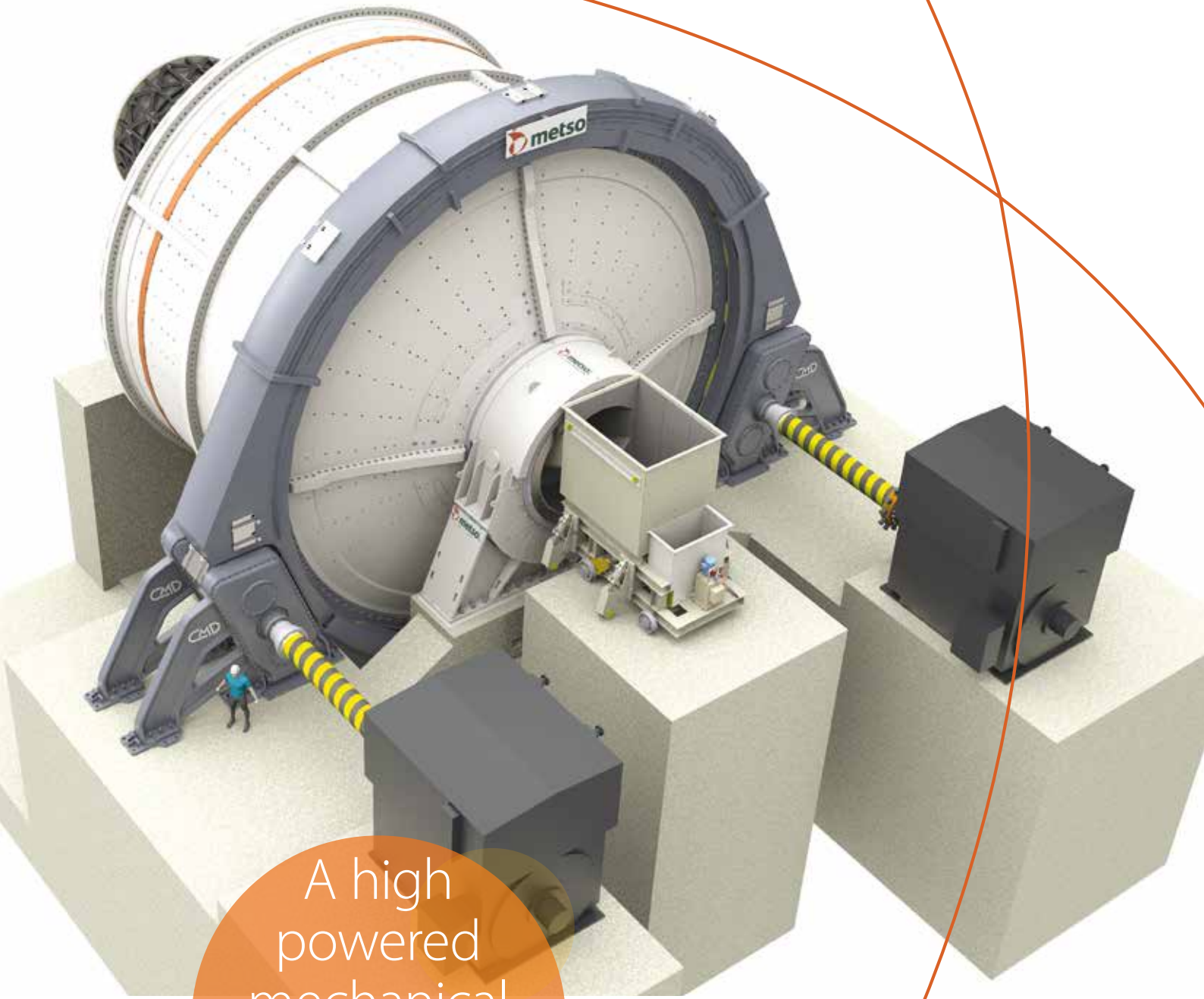
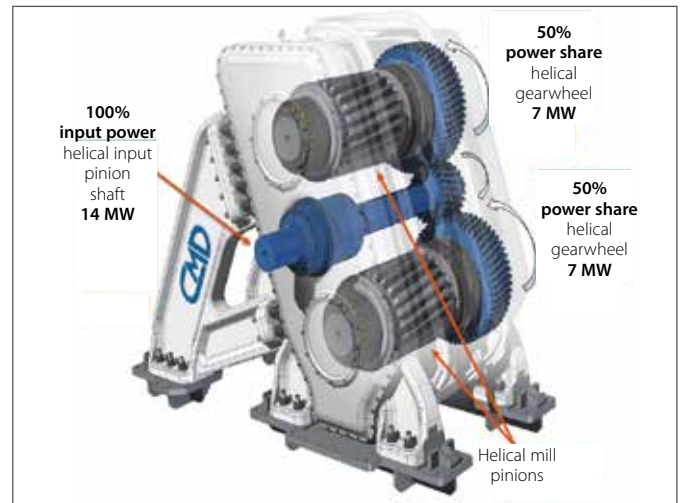
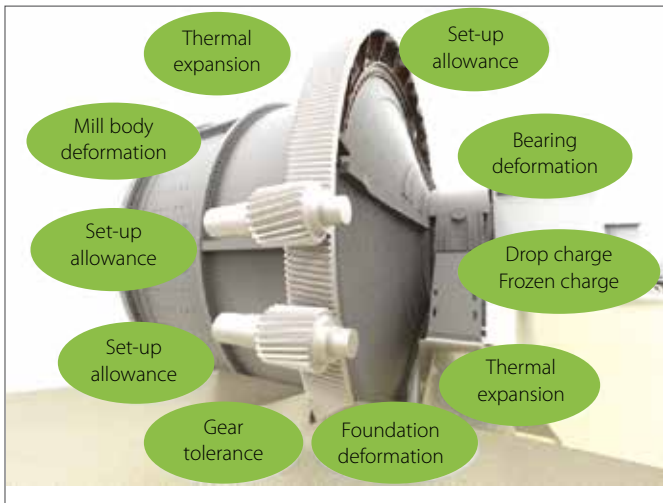


Metso QdX4™ Mill Drive system



A high
powered
mechanical
solution

Up to 32 MW in horizontal
mill comminution

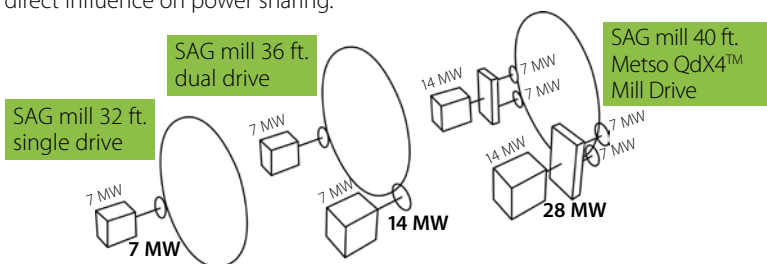


The natural progression in gear/pinion mill drives:

The Metso QdX4™ Mill Drive provides the next step in the evolution of change in mill drive architecture, while allowing the system to be built with components that are within current manufacturing capabilities. We are essentially providing up to twice the power transmission of a conventional dual pinion drive. Going from a dual pinion to a quad pinion arrangement is in fact the natural progression to a robust, innovative mechanical solution allowing our customers to move forward with large gear driven equipment to achieve your comminution goals.

Direct influences applied to the mill drive system

For the Metso QdX4™ Mill Drive system, exhaustive research was conducted to identify all the parameters influencing the entire kinematic chain. These were evaluated for both the drive and the mill itself throughout the life of the system, so that no single parameter would be ignored. The figure above depicts many of the parameters considered in the overall design that may have combined direct influence on power sharing.



The new high-powered mechanical solution

The Metso QdX4™ Mill Drive was developed in close collaboration with both CMD and Ferry Captain Engineering as a solution for the mining industry for large mill drives. The Metso QdX4™ Mill Drive features internal torque splitting capability transmitting motor input power to the pinion shaft and equally dividing into two mill pinions. This type of torque splitting gear box technology has been in operation since the early 1960's. We have rearranged the drive architecture in order to apply high powered transmission to large grinding mills in the mining industry.

Full scale test bench

To fully develop the Metso QdX4™ Mill Drive solution, a full scale instrumented test bench was designed and constructed to test the Metso QdX4™ Mill Drive torque dividing system under the most severe operating conditions.

- Tested to over 3×10^6 cycles
- Verified torque sharing
- Verified tooth contact pattern
- Verified dynamic behavior
- Ran at full speed



CMD test bench



Condition monitoring

Product features

- Robust design: Cast and machined housing
- Helical gear design per AGMA standards
- Standard input shaft size and keyed couplings
- Standard pinion bearings
- Accepts standard input motor/drives: Low speed synchronous or induction motor with variable speed drive.
- Standard foundation base plate design and installation
- Standard embedded foundation anchor bolts
- Allows for standard gear/pinion installation and alignment, very similar to traditional dual pinion drives
- Ring gear is integrally sealed with the gear guard
- Cast, fabricated and machined gear guard that allows for oil lubrication recycling
- Gear drive: modular design
 - Patented replaceable gear wheels/pinions assemblies
 - Replaceable standard bearings and input pinion shaft
 - Interchangeability
- Load sharing: accomplished internally and automatically
- Capable of inching and creeping of the mill
- Ease of maintenance with site personnel

Two separate closed-loop, water cooled lubrication systems:

1. Open mill girth gear/pinion lubrication system

- Eco-friendly dual pinion (quad) oil spray system with auxiliary lubrication/oil conditioning unit
- Controlling instrumentation for temperature pressure and oil flow monitoring
- Completely sealed, conditioned gear lubrication (360°) around the gear guard
- Uses standard gear oil, wide variety of lubricants available
- Access for gear/pinion inspections

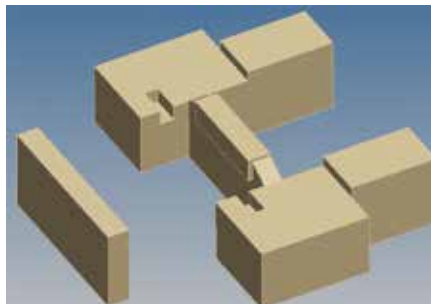
2. Internal gearwheel/Input pinion drive lubrication

- Separate internal compartment for gear drive lubrication
- Bearing lubrication
- Instrumentation monitoring

Economic value

Overall cost savings

- Foundation design requirements are very similar to dual pinion drive mills.
- Significant time savings in installation and commissioning, leading to quicker mill availability.
- Reduced equipment mass means a reduction in required shipping and lifting/crane capacities.
- Reduction in capital, operating and maintenance spare parts.
- Less complexity, simplifies training and specialized services.
- Standard motor design



Foundation

Standard design

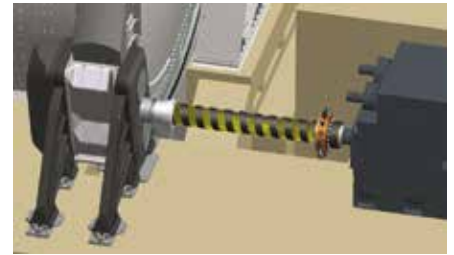
- Standard gear driven foundation loading.
- Seismic loading easily calculated.
- No static or dynamic modal analysis required.
- No brake pier required.
- Lower pier heights, less concrete volume.



Lubrication

Improved eco-friendly systems

- The Metso QdX4™ Mill Drive is supplied with two individual, standard, closed loop skid mounted lubrication systems. This allows for separating any contamination entering the high powered drive system.
- One for the INTERNAL drive gearing system, and one for the OPEN MILL gearing.
- A wide variety of lubricants are available.



Millmotor/drive

High powered efficiency

- Dual motor load sharing between two Metso QdX4™ Mill Drives.
- Low speed synchronous or induction. Motor with Variable Speed Drive (VSD)
- Dual motor drives are capable of:
 - Inching and creeping
 - Frozen charge detection
 - Use of standard temperature and vibration sensors
- Standard torque limiting coupling



Mill gearing

Manufactured by CMD and Ferry Captain

- Open helical gearing design remains nearly unchanged from that of dual pinion drives.
- Applied AGMA or ISO service factors.
- Power is divided between four pinions to reduce the overall load per unit length.
- Gear fabrication, machining and hardness for a 40' SAG mill remains within current achievable limits being manufactured today.

Installation and maintenance

- Installation procedure is very similar to the alignment of a dual pinion drive.
- Trained on-site personnel can maintain drive system.

Standardization

Allows for single line application with identical Metso QdX4™ Mill Drive units installed in both 40' SAG and 28' Ball mills. This allows for complete interchangeability, and reduced amount of site spares.



Metso Grinding Equipment

Expect results

It is our promise to our customers and the essence of our strategy.

It is the attitude we share globally; our business is to deliver results to our customers, to help them reach their goals.

