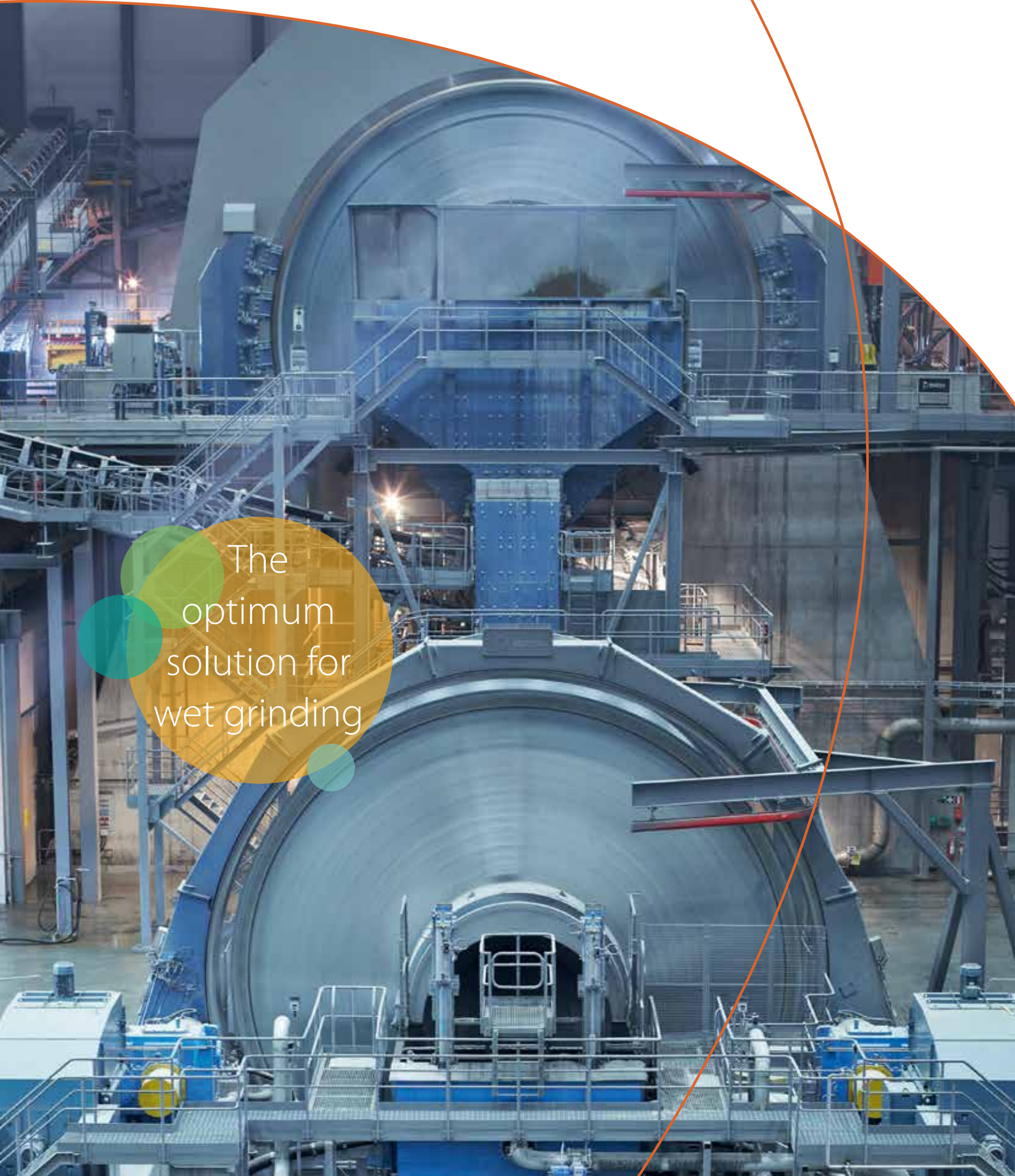


Autogenous and Semi-Autogenous Mills



The optimum solution for wet grinding





Metso's AG/SAG mills accomplish the same size reduction work as 2 or 3 stages of crushing and screening

The feed size for these mills is limited to the maximum size that can be practically conveyed and introduced into the large mill feed chutes. And the product of the large AG/SAG grinding is either a finished size ready of processing, or an immediate size for further grinding in a ball mill, pebble mill, VERTIMILL® or a stirred media detritor (SMD).

Application

AG/SAG mills are normally used to grind run-offmine ore or primary crusher product. Feed size to the mill is limited to that size which can be practically conveyed and introduced into the mill. The mill product can either be finished size ready for processing, or an intermediate size ready for final grinding in a ball mill, pebble mill, or VERTIMILL™.

Wet grinding is accomplished in a slurry of 50 to 80 percent solids. AG/SAG mills can accomplish the same size reduction work as two or three stages of crushing and screening, a rod mill, and some or all of the work of a ball mill. Because of the range of mill sizes available, AG/SAG milling can often be accomplished with fewer lines than in a conventional rod mill-ball circuit. All of the above contributes to lower capital cost and lower maintenance cost for an AG/SAG mill circuit and accounts for the current popularity of this type of size reduction in modern mineral processing plants.

In some ore bodies, due to moisture and clay content, crushing and screening is considered to be difficult, if not impossible. The elimination of the process step with the use of AG/SAG milling is most advantageous.

Testing of the ore

It is essential that the ore be tested to determine its amenability to AG/SAG milling, the grinding power requirements, optimum milling conditions, and grinding circuit arrangement. These are conducted on a representative sample of ore at the Metso test plant in York, PA. For most ores, small samples (about 100 pounds) are adequate to judge the suitability of AG/SAG milling and to make a preliminary estimate of grinding power requirements.

A second level of testing (using a 1,000 pound sample), conducted in a 6 ft. batch mill, can be conclusive if the ore resembles ore previously tested. The third, and most precise, level of testing involves continuous milling in a 6 ft. x 2 ft. AG/SAG mill. Up to 50 ton samples are required for each ore type to be tested. The results of this test provide accurate information for the optimum mill sizing and circuit design for a commercial installation.

Grinding circuit design

AG/SAG milling can be accomplished with a variety of flowsheets. The optimum flowsheet should be established during the testing of the ore. Common flowsheets include:

- AG-Single Stage
- AG in a closed circuit with a crusher
- AG with a crusher + ball mill
- SAG-Single Stage
- SAG with ball/VERTIMILL™

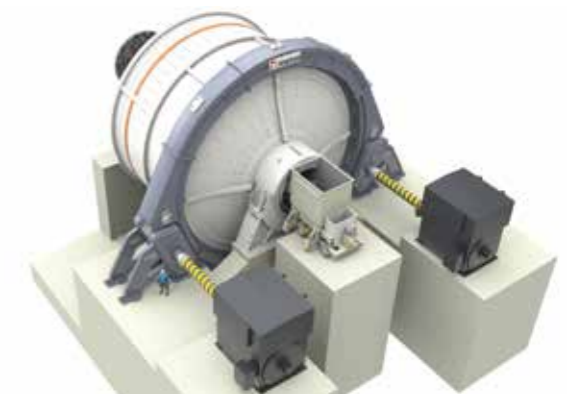
Metso's process engineers welcome the opportunity to assist you with circuit and circuit control design as well as start-up, operation, and optimization of the milling plant.

Our engineers can specify or supply computer control systems for the sophisticated circuits. The cost of computer hardware decreases almost daily, making these controls feasible for smaller installations. It is possible with automatic operation to save power, grinding media, and liner wear, while increasing capacity. Software can be developed to suit the most complicated circuits and complex ores. Development of the software is often unique to a specific ore and concentrator and is timeconsuming to develop, but is ultimately rewarding. Productive grinding systems are the result of the efforts of disciplines ranging from mechanical design and metallurgy of materials to process engineering and instrument application. Desired grinding results are achieved only through careful and skillful attention to detail.

Experiences from the past have been carefully considered in the development of the Metso AG/SAG mills which are presented in this bulletin. All equipment adheres to the applicable standards set by ASTM, NEMA, AGMA, AWS, and ANSI. Metso mills are equipped with all normally required safety features. Designs to meet other codes and local or state safety regulations will be quoted on request.

Metso Qdx4™ – 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.



The Metso Way – Making the big difference to our customers

Everything we do is based on deep industry knowledge and expertise that makes the big difference to our customers. Decades of close customer collaboration and adapting to our customers' ever changing needs have transformed us into a knowledge company.

