Technical Solution

TUMBLING MILL

"Running a mining operation is a complex task with many critical process steps, and one of the most production-critical applications in our operation is our mills. They are high-cost equipment in terms of capital investment as well as the operational costs involved and, often considered as the heart of the operation due to the few, large units they normally comprise.

Thanks to the toe position monitoring solution from SPM Instrument, we have been able to avoid mill overload and have thus experienced an increase in production time. We can strongly recommend the system from SPM Instrument as an effective tool for mill downtime prevention."

- Erik Larsen, Plant Manager, Rana Gruber iron ore mine, Norway

Process optimization | Mining | Tumbling mill

Maximized grinding efficiency and throughput

A critical success factor in optimizing the efficiency and performance of the grinding process is mastering the toe position of the mill charge. SPM's toe position monitoring solution is a process optimization tool for detecting the early onset of an overload condition in tumbling mills. It provides insight into charge dynamics and enables operators to optimize comminution efficiency.

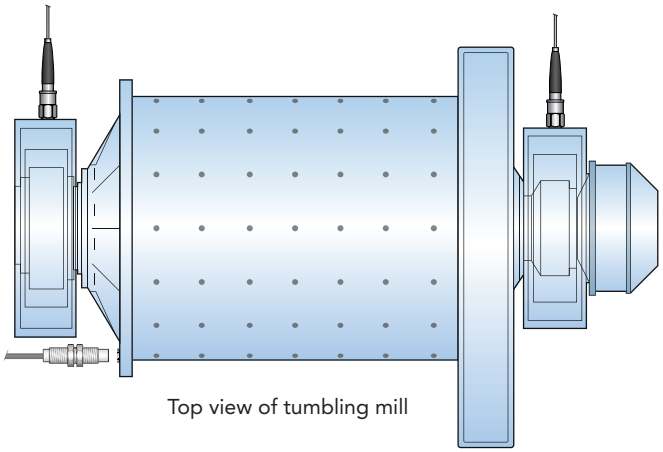
Even a slight increase in throughput can impact the bottom line dramatically. SPM's toe position monitoring solution takes advantage of high-quality vibration data to unlock the hidden potential of process optimization. The overall purpose is to keep the mill running as close as possible to maximum working capacity while at the same time avoiding the risk of mill overload, underload, and freewheeling.

Providing high-resolution toe position data with exceptional accuracy, the solution is an effective tool for operators to determine the ideal feed rate for optimal grinding conditions. Optimizing the toe position also has a positive impact on particle size distribution, an essential parameter for the efficiency in the separation stage.

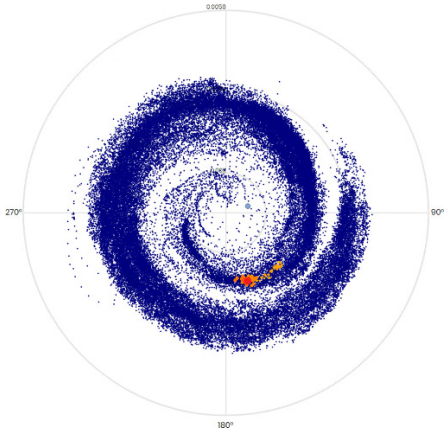
Further benefits include the monitoring of:

- wear-and-tear on the liner and lifters
- outlet blockage
- density
- big rock occurrence

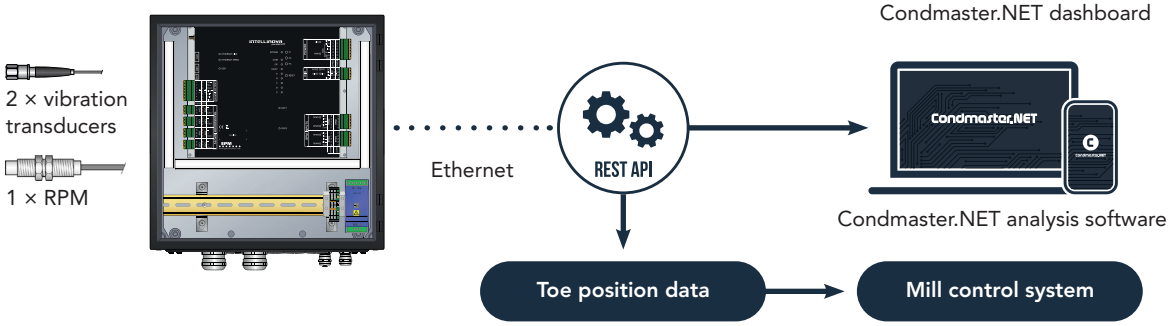
The toe position monitoring solution is a powerful, user-friendly process optimization tool with low investment cost and rapid return on investment. It is a highly impactful complement to our high-performance machine condition monitoring solutions, designed to reduce maintenance costs and maximize equipment uptime.



Top view of tumbling mill



Condmaster.NET dashboard



Unique, data-driven optimization of the grinding process

The toe position monitoring solution measures the position of the charge toe with exceptional accuracy, using vibration measurements with patented HD condition monitoring technology. The toe position usually differs at the inlet and discharge ends of the mill. This solution is unique in that it measures vibration at both ends, rather than at a single position.

The installation is straightforward and robust, without any equipment attached to the mill's rotating shell. A single vibration transducer, mounted on each side of the mill's main bearings, measures the lifter signature, while tachometer provides a reference signal.

Charge toe position data is displayed in a clear and visually appealing web-based dashboard, where the information is updated approximately every fifteen seconds. The update interval varies depending on the mill's rotational speed. As an added benefit, the dashboard also provides an indication of the charge toe area density.

Through a REST API interface, the charge toe position and density indication can also be integrated into the mill control system to enable automatic mill control.

The monitoring solution requires:

- an eight-channel Intellinova Parallel EN online system
- two vibration transducers
- one tachometer
- a Condmaster software license
- a subscription to the custom dashboard presenting toe position data

Performance, productivity, and peace of mind

Early failure detection is crucial to maximizing equipment life and performance. With over fifty years of experience, SPM Instrument has the technologies, equipment, and expertise to offer efficient and flexible condition monitoring solutions for all types of industry. Through a worldwide network of resources, we provide a complete line of measurement technologies and high-performance products for industrial condition monitoring.

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