

Technical Solution

MACHINE TOOL SPINDLE

Condition monitoring

Machine tool

Spindle

Superior condition monitoring of machine tool spindles

Taking full advantage of patented HD condition monitoring technology, SPM offers a complete and reliable solution to monitor the condition of machine tool spindles, providing early warning and pinpointing bearing damage and other machine problems that can quickly cause quality and reliability issues.

One of the most essential machine tool components is the spindle. Machine tools may have one or multiple spindles, the operation of which significantly affects product quality and production speeds. Driven by an electric motor, modern high-precision spindles are compact units, very efficient at high speeds ($> 10,000$ rpm), and usually with high- or ultra-high-precision biased bearings. Common problems on machine tool spindles include bearing faults, imbalance, and machine structure issues.

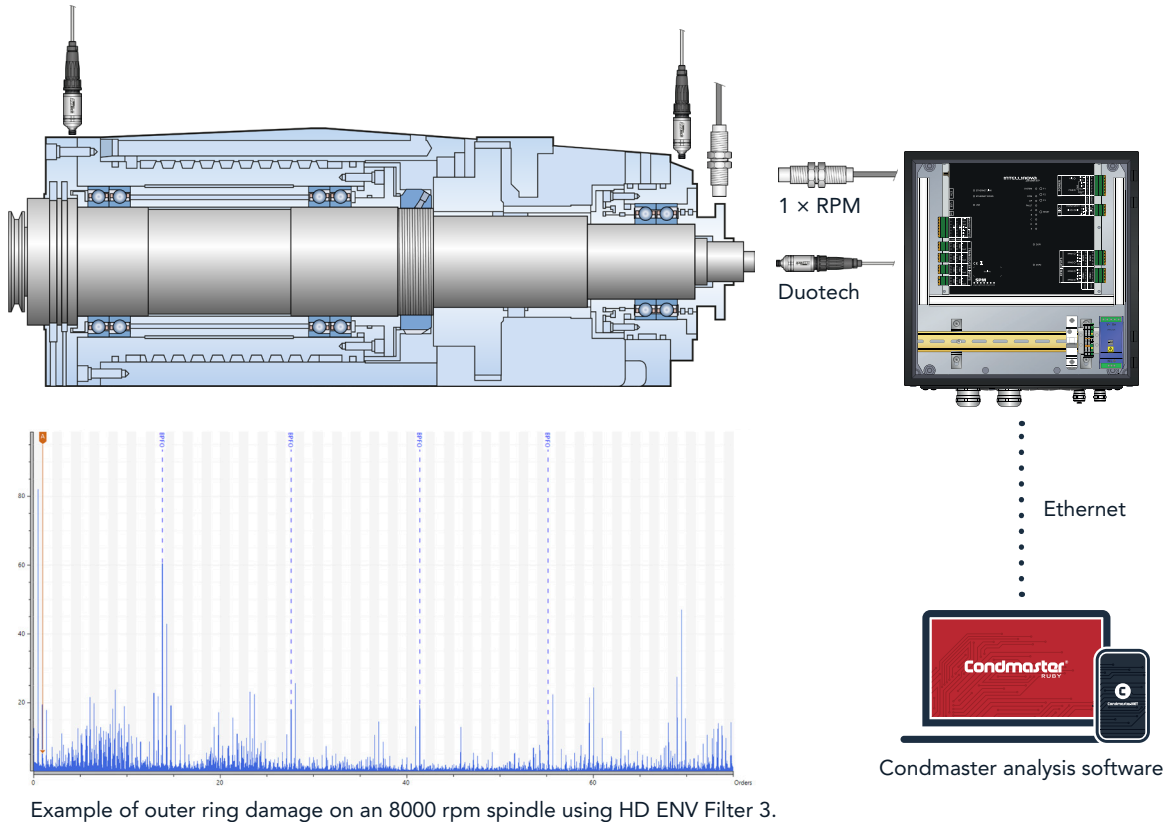
Unique possibilities with HD condition monitoring technologies

Symptoms of bearing problems in spindles can be extremely low in vibration amplitude or not even show up in spectrums using traditional technologies like velocity or acceleration measurements. Furthermore, due to very rapid damage progression, early warning of emerging problems is essential to avoid product quality problems.

Using well-proven HD monitoring technologies, we provide the technical solution required to meet these challenges. In numerous successful installations, vibration and shock pulse measurement with HD technology has proven effective and reliable for gear, bearing, and lubrication monitoring with excellent results.

A critical success factor when implementing online condition monitoring on spindles is ensuring that the machine tool control system is programmed to trigger data acquisition under the exact same conditions on every measurement occasion and while no machining is taking place. If periodic measurement with handheld instrumentation is used, the operator decides how the machine is run and when data collection starts.

System configuration



The SPM condition monitoring solution

The machine tool working area is enclosed and locked for safety reasons, making it difficult to access the spindle components for measurement during operation. Thus, a fixed installation of sensors and cabling with stainless steel protection tube is required, supplemented with a junction box if manual measurement is used. Typically, the monitoring solution requires a single DuoTech transducer installed on the spindle nose. The rotational speed is set by the operator in the machine tool control system.

The Intellinova Parallel EN system with parallel and synchronous channels provides detailed information on the mechanical condition of components using the patented HD ENV and SPM HD measurement technologies. The system has a response capacity with maximum efficiency and provides razor-sharp condition data and exceptional forewarning times on developing mechanical faults.

Sophisticated digital algorithms make HD technologies less sensitive to interference from other signals. Crystal clear measuring results easily understood and evaluated, make it possible to study the development of gear and bearing damage over many months.

SPM condition monitoring solutions transform high-definition measurement data into actionable information, enabling personnel to make preventive maintenance priorities for critical assets. Based on crystal-clear condition data, maintenance decisions will be well-informed and confident.

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 and process optimization.