

Function

The sensors installed in the Schaeffler SpindleSense measure the displacement of the spindle shaft under load in a **very high resolution** and **in five spatial directions** – **three translational** and **two rotatory**.

The sensor ring transmits an **electrical warning signal to the machine's control system** if the deflections measured on the rolling elements exceed a specific threshold. The threshold is set individually for each spindle and machine type.

The threshold is based on an assessment of operation-related bearing parameters such as pressure, spin/roll ratio, and cage pocket clearance, into which Schaeffler has integrated its many years of expertise in rolling bearings.

All of the software and the required algorithms are integrated into the sensor ring. No further components are required for the system. The system is **locally functional** and transmits an **individual warning signal** to the machine's control system.



1 Sensor unit
Components of the sensor unit
2 Sensor ring
3 Radial measuring ring
4 Axial measuring ring

Setup



Available variants

C-A0 Alarm signals are issued when load or kinematic limit values are exceeded

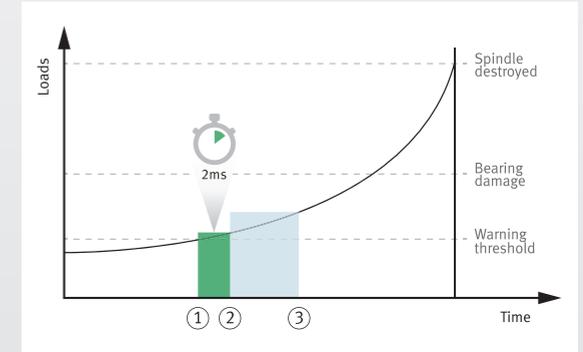
C-A1 Data are issued on the measured displacements (axial and radial) as well as tilting via CAN bus

Application example

Use case 1 – Overload

Bearing damage to the motor spindle can be prevented by early detection of crash situations.

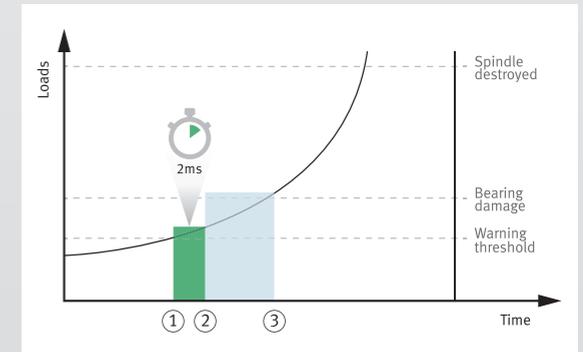
- Prevention of bearing damage
- Improvement of availability



Use case 2 – Crash

Subsequent damage to the motor spindle can be prevented by early detection at high speeds.

- Reduction of subsequent damage or total failure of the motor spindle
- Reduced costs in the event of damage



1 Warning threshold exceeded
2 Detection of overload through Schaeffler SpindleSense
3 Machine stops

Schaeffler SpindleSense

The main spindle is crucial to the performance capability of the entire machine tool. It is at the heart of the machine and largely defines the achievable cutting capacity, surface quality, and precision.

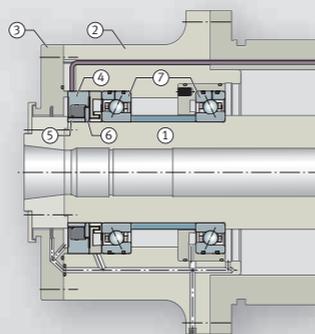
The spindle bearing support is among the most heavily loaded components and has to precisely transfer machining forces at very high speeds for long periods of time. The majority of failures is caused by defective spindles, since it is still not possible to fully eliminate collisions; this leads to constant but undetected overloading.

Unplanned machine downtimes can be prevented through detection of main spindle overloading and subsequent alarm messages.

Make the real loads that occur in your machine tools transparent and enjoy increased machine availability, productivity, and quality.

The advantages at a glance

- Protection against continuous overload and collision damage
- Direct measurement of the deflection and deformation of the spindle
- The combination of displacement measurements and Schaeffler's rolling bearing expertise allows operating conditions to be assessed
- Locally functional
- High resolution (below 1 μm)
- Detection of critical operating conditions within 2 milliseconds



- 1 Shaft
- 2 Housing
- 3 Housing cover
- 4 Sensor ring
- 5 Radial measuring ring
- 6 Axial measuring ring
- 7 Spindle bearing

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Rolling bearings
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SCHAEFFLER SPINDLESENSE

for the main spindle



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