creating precision.

Qsigma

SMS

SPRING MEASUREMENT SYSTEM

How Qsigma, together with Mubea, has taken the setup process for axle springs to a new level.



Mubea

Qsigma

Mubea is a global leader in manufacturing innovative products for chassis, bodywork, and drivetrains in the automotive industry. With new lightweight products, materials, and manufacturing technologies Mubea offers innovative solutions for lighter vehicles in close cooperation with its customers and scientific institutions, creating groundbreaking innovations and setting international standards. In the chassis, the axle spring significantly influences safety and driving comfort.

For further optimization of the manufacturing process and the quality of the axle springs, precise 3D measurement of the axle spring is crucial, as it greatly affects the function of the spring in the vehicle.

This posed a challenge for Qsigma to develop such a measurement system specifically for axle springs.

REQUIREMENTS

The new measurement system should ensure wear-free, fast, and very precise measurement and reduce operator influence to a minimum.

The measurement systems available on the market, in particular, could not achieve the required measurement accuracy.

SOLUTION

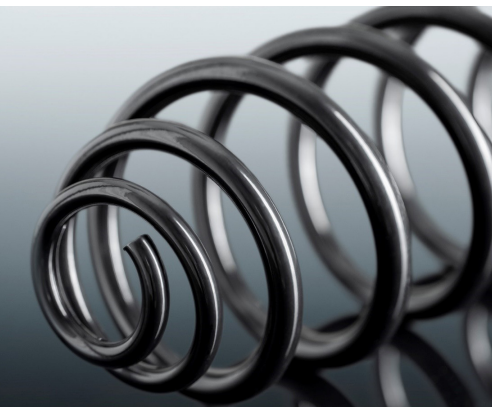
Qsigma developed the new SMS (Spring Measurement System) based on optical measurement methods. The spring contour is captured by state-of-the-art laser sensors and equipped with the InnoMeas software for data evaluation and transmission.

The spring's clamping system was also revised to keep the measurement consistently precise and minimize operator influence.

BENEFITS

With the new SMS measurement system, Mubea was able to improve the repeatability of measurements by a significant factor. The system automatically controls the influences of speed and geometry, while the detection of the spring ends is fully automated.

The measurement system is now integrated into the setup process of axle springs at Mubea.







INITIAL SITUATION

For several years, Mubea had been using a mechanical measurement system for measuring axle springs, which provided reliable results. However, the company identified optimization potential that could be implemented through a new measurement system. The optical measurement systems available on the market did not meet Mubea's specific requirements for accuracy and usability.

REQUIREMENTS

It was necessary to develop a new automated measurement system that is robust against wear, offers stability and precision with a higher throughput, and reduces manual operator influence to a minimum.

The measurement system should also be used in Mubea's development, especially for the automated transfer of the virtual spring geometry to the CNC coiling machine. The system should be able to precisely compare the actual geometry of the manufactured spring with the target data. The accuracy of the measurement is essential for the successful setup process of the spring. The previous manual procedure required a lot of experience and know-how and was very complex. This was to be automated with the new spring measurement system.

Requirements summarized

- Operator influence must be virtually eliminated by automating the detection of the beginning and end of the spring
- The speed of the spring's rotation during the measurement process should be increased while maintaining repeatability
- Wear-free measurement should be enabled (laser measurement method)
- An interface to Mubea's self-developed software must be implemented



IMPLEMENTATION / CHALLENGES

Qsigma designed the spring measurement system so that the chassis spring is vertically fixed between two interchangeable cones, which rotate the spring during the measurement process. Due to gravity, the position of the measuring object remains stable, there are no deviations caused by tension, and no special expertise is required to position the spring.

To ensure contactless and thus wear-free measurement, Qsigma has relied on modern laser measurement technology in cooperation with the German manufacturer Micro Epsilon from the beginning.

The particular challenges during the development phase were the detection of the spring ends and the recognition of inhomogeneous surfaces. For example, this could have varying roughness, be partially reflective, or painted. Qsigma successfully tackled this task in close cooperation with Mubea and with persistent programming work on their own measurement software, InnoMeas.

Thanks to its proprietary software development, Qsigma can always promptly meet individual customer requirements and develop tailor-made solutions. Therefore, compatibility with Mubea's own algorithm could be easily established.

The developed measurement system is named "SMS – Spring Measurement System".

CONCLUSION / BENEFITS

With Qsigma's new measurement system, the quality requirements were fully met, and the optimization tasks were successfully completed. The introduction of the new spring measurement system brings significant benefits. The repeatability of measurements was significantly improved. In particular, the optical, contactless measurement leads to faster, stable, and precise measurements, and wear of the sensor technology compared to the original tactile measurement is completely eliminated.

The interplay of the measurement system with Mubea's algorithm made it possible to convert the virtual prototype spring into an exact physical spring within an acceptable setup time and cycle. With this capability, Mubea offers its customers a clear advantage by shortening the time from the development process to the first prototype production to achieve the desired quality. Moreover, it is extremely advantageous in later series production that the system can seamlessly transfer the prototype geometry to the spring plants. This transfer is enabled by the SMS system and significantly optimizes the required processes.

The collaboration with Qsigma was essential for this progress. The flexibility to meet all requirements, the ongoing adaptation and optimization of the system, and the internal expertise in computer science and mechanics contributed significantly to the project's success.



Qsigma

WHERE WE OPERATE



qsigma.de

CONTACT
+49 5622 930807-0
info@qsigma.de

ADRESS
Qsigma GmbH
Brautäcker 4 | 34560 Fritzlar | Germany