

Sparkling results

Non-contact measurement of clearances and offsets on car bodies with opto-electronic single handed meter.

In automotive production, accuracy is critical – no gap can be too wide and no offset too large. As a result, measuring instruments are required that deliver unambiguous results and leave no traces on the body paint after testing.



The inclination angle between the measuring instrument and the surface is detected and used to correct the result. This means that precise alignment of the manual sensor is not essential for the measurement.

Clearances and offsets on bodies are a key quality criterion for every production process in the automotive industry. Absolute - 100% - accuracy is therefore a must. Conventional scanning measuring methods have weaknesses: Classic measuring errors occur, for example when measuring with sliding calipers, due to skewed readings, undefined measuring force or inclined positioning. These operator errors normally lead to imprecise and unusable measured results. There is also a risk that the highly sensitive vehicle paint will be damaged by the mechanical measurement.

To prevent errors and paint damage, the Graz-based high tech company Nextsense Mess- und Prüfsysteme has developed an opto-electronic single-handed meter, which detects different profile shapes fully with no contact. The measured profiles can be used to calculate relevant features, e.g. clearances and offsets, preventing classic measuring errors caused by the user. The measured result is therefore independent of operator influences and thus is objective and reproducible at any time. The non-contact measurement also prevents dam-

age to the measuring instrument caused by lubricants or other materials, or the object to be measured.

Close-up measurements

To perform the measurement, the user holds the meter in his hand around 10 cm above the measuring object. A sensor and a camera scan the profile of the measuring object from different sides. The sensor is connected to a tablet PC, which can be conveniently carried over the shoulder. Tilting of the meter is automatically detected, and the measured result is corrected accordingly. The entire measurement takes around five seconds. It is important that the meter is moved around the measuring object to capture the contours from several angles. The hand sensor does not have to remain at an exact distance and angle from the measuring object. If the sensor is too far away from the object, an acoustic signal sounds. The meter evaluates the measured data itself and discards any unsuitable data.

*USB uEye LE
Board level version*



USB 2.0 uEye cameras from IDS Imaging Development Systems ensure 100% accurate measurements. The type UI-1221LE-M-GL cameras integrated into the meters meet the high standards that were set by the Nextsense engineers – compact dimensions, variable object installation, and power supply via USB 2.0. Inside the camera is a Wide-VGA-CMOS sensor produced by Aptina and a global shutter that delivers completely distortion free images. Other criteria when selecting the camera included the high sensitivity of the sensor and the high frame rate.

Scope for further developments

To evaluate the measured data, Nextsense uses proprietary image processing algorithms. The measured values are supplied in XML or CSV format for processing on the tablet PC. The Nextsense Calipri Explorer also enables measurements to be visualized and analyzed. It is also possible to compare the measured values with setpoints and to monitor changed measured values over a long period, for example to detect signs of wear. The software package is designed for easy expansion, allowing customer-specific adaptation at any time. It also allows easy programming. The comprehensive function library in the Software Development Kit (SDK) can be accessed using standard C++/C# or VB-based programs. The user can easily switch to different IDS camera models or interfaces without any additional programming, i.e. the engineers have provided plenty of scope for future developments.

However, the possible applications of Calipri single-handed meters are certainly not limited to automotive technology. Different versions open up applications in rail vehicles, measurement of elastic profiles, weld seams, cracks, bending contours and much more.

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