



Non-contact laser measurement in the automotive industry

The laser triangulation sensor as a non-contact measured value sensor has been used as a reliable and universally applicable instrument in production regulation and quality inspection for many years in many sectors of the automotive industry. Moreover, non-contact laser sensors are becoming increasingly popular in test drives under real driving conditions.

Research & development Application examples
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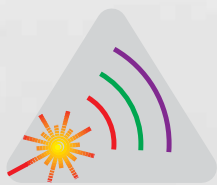
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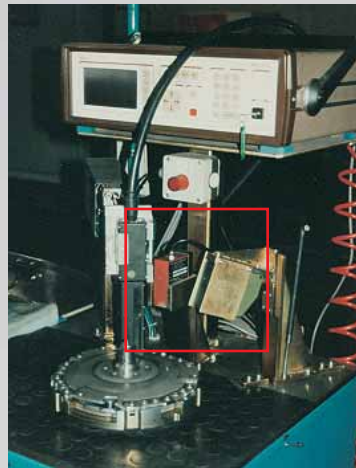
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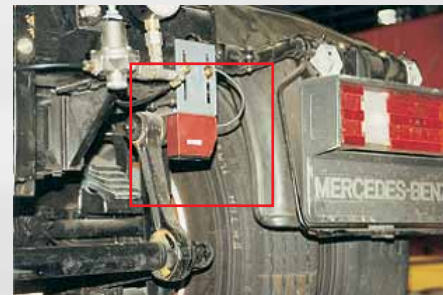
Research & development

Crash tests are one of the favourite areas of application because here the large measuring ranges of up to 1500 mm available in a possible bandwidth of 20 kHz allow carriage movements or deformations of parts inside vehicles to be measured without contact. The high scanning rate of 50 kHz is also required to measure the valve stroke within the scope engine testing at maximum speeds. Much lower measuring frequencies

are required for using the laser in the digitisation of components for body development. Here the laser sensor replaces the tactile probe of the z-axis on measuring machines with the advantage of much higher measuring speeds at a greater data volume for one thing because movement can take place continuously in x and y direction.

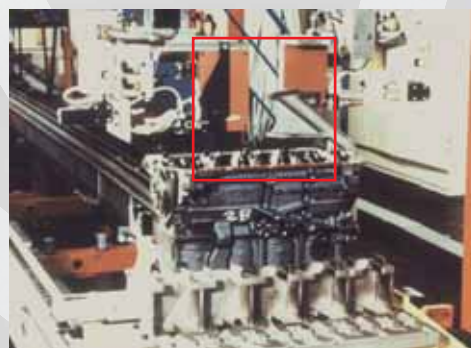
Test drive

The laser is almost unrivalled in its use for non-contact measurement of the distance of the vehicle from the road. The implemented sensors are ideally suitable for measurements on all surfaces from bright concrete, gravel and off-road surfaces to jet black, wet asphalt. The arrangement of several sensors enables measurement of rocking angle and clearance – often saving the use of the standard platform which leads to shorter tooling times and universal application possibilities in addition to considerable reductions in weight. Due to the large spectrum of measuring ranges and measuring distances, all kinds of component changes such as movement of the engine, the exhaust system, the drive and cardan shafts and the steering linkage as well as the shock absorber travel can be measured. In the latter case the sensor can be fixed directly to the shock absorber leg due to its compactness.



Production

In production, the main applications are in dimension control and automated assembly. Dimensions of brakes, clutches, axles and whole bodies are checked. In the assembly sector contours have to be recorded if possible along a measuring line and not only at points. Here, laser scanners are used in which the measuring beam is deflected by a system of mirrors and systems with CCD matrix detectors (light intersection sensors) in which a measuring line is generated by optical expansion. Such systems are used mainly in the robot assembly of doors and windscreens. Their measuring line offers the advantage of being able to measure gaps from other body parts exactly. Sensors with a special protective flap are available for position the welding heads of robots.



Supplier industry

The increasing use of laser measuring systems in this sector is due to the constantly growing demands on quality and documentation of the supplied automotive industry but also due to the progress in production automation. The measuring jobs range from safety components such as the airbag or chassis components, through thickness measurements on gaskets or brake linings right up to fully automatic online checking of clutch disks, cardan shafts and wheel rims. Automated checking of clutch disks has reduced the defective parts of one large supplier by more than 60% for example.

Recording of road surfaces

Since, as already mentioned, the distance from the road surface can be measured during movement of the vehicle, the opposite, namely the detection of road conditions and surfaces is also possible. This is important for the test



stand simulation for which as accurate information as possible about the real road conditions of test courses is required to perform a practice-oriented simulation. In addition, knowledge of road surfaces is an important parameter in the development of tyres and active chassis' for series vehicles. A specially developed vehicle licensed by the Federal authorities enables

measurement of the longitudinal and transverse profile of the road for documenting the nation-wide condition of roads.



Motor sport

Due to the increasing importance of aerodynamics for motor sport and the associated demand for a constantly optimum distance of vehicle to road, laser sensors are now being used more and more in other racing classes, such as DTM, apart from Formula 1 in which they have already been used for a long time. In addition to merely measuring the distance and shock absorber travel for optimum chassis balance, these sensors also allow the active regulation of a chassis in a further step. Extreme demands are made with regard to shock resistance and miniaturisation due to the restricted space available in motor sport.

