



Non-contact laser measurement in the tyre and rubber industry

OPTImess laser sensors are becoming an increasingly universal measuring instrument in Research & Development, Production, Quality Assurance and Testing departments of the rubber and tyre industry due to their small size, high measuring frequency and accuracy and their ability to measure under almost all ambient conditions.

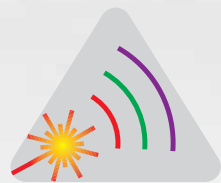
You will find the addresses of our numerous foreign representatives in the Internet.

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Bridgestone, CONTINENTAL AG, ContiTech Antriebssysteme, GOODYEAR, Marbor, MICHELIN, PIRELLI, Seichter, SEMPERIT, UNIROYAL ... are already satisfied customers of Dr. D. Wehrhahn Measuring Systems.



The Laser – The universal measuring instrument



Tread measurement

The entire contour of a tread can be measured by two traversing laser sensors (above and below the material). The measurements are possible for both car and lorry treads. The measured profile is compared with a master profile in the computer and monitored with respect to given tolerances. Logging and graphic display of the tread is possible. Measuring systems for offline and online measurement are available.

Profile measurement

It is possible to measure profile surfaces by combining an OPTImess laser sensor with a drive unit, e.g. linear unit or robot. This may be profiles of tyre surfaces and technical products of the rubber industry such as the profile of single or multiple V-belts or toothed belts. The possibility of adapting the laser point diameter individually to sensors in OPTImess as well as the ability to measure on inclined surfaces up to about 80° open up new possibilities for online quality inspection.



Thickness measurement

Two sensor layouts are available basically for the thickness measurement. One sensor is used for the reference measurement on a roller. The product runs over a roller which is used as a basis for the zero point. The subsequent measurement on the product is set off against the zero point and output as a thickness. In the thickness measurement with two sensors the product runs between two sensors, one above, one below the material. The difference between the two sensor values gives the thickness. The advantage of this measuring set-up is that the product can move vertically to the direction of travel without causing measuring errors. Air-cooled OPTImess sensors are available for measuring warm materials. Traversing thickness measuring systems are available in addition to the stationary thickness measurement with separate measuring tracks.



Width measurement

Two OPTIline systems are used respectively for the width measurement. The width is measured by the shadow measurement method which means that the laser generates a parallel band of light which is projected onto a detector. The continuous rubber band shades part of the laser beam from the detector. The position of this shadow is evaluated and output as a width by calculating the difference of both systems. No additional light source is required for the measurements.



Overlap measurement

It is very important for the manufacturing of tyres whether two layers of rubber overlap, touch or form a gap. OPTImess sensors are suitable for quick detection of measured value jumps or overlaps due to their high measuring frequency (bandwidth) of up to 50 kHz. Edge jumps can therefore be detected with a high reproducibility in connection with a distance measuring system.

Expansion measurement

The non-contact scanning of the tyre surface enables measurement of the expansion of a tyre at maximum speeds. This can be done both on the test stand and directly on the vehicle.

Non-concentricity measurement



It is possible to measure the vibration and wobble up to maximum speeds using the special OPTIline system. Here too up to 20,000 measurements/s are possible. Special OPTImess laser sensors are being used in test machines made by Seichter as an alternative to capacitive measurement for non-concentricity and dents.

Thread control

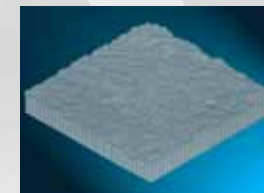
Thanks to the high measuring frequency of the OPTImess sensors in connection with the possibility of using a small laser spot, the thread position on rubber steel cord or textile layers can be controlled.

Deformation measurement

OPTImess sensors allow non-contact measurement of tyre deformations under different test conditions such as wheel load, track and king pin angle. These may be measurements on the roller test stand but also measurements on the test vehicle – due to the small size of the sensors. An extreme application here is the deformation measurement inside a lorry tyre. A special OPTImess sensor is mounted on the rim inside the tyre and measures the contact surface of the tyre.



Test drive/Texture measurement



The laser is a virtually unrivalled measuring instrument for the non-contact measurement of the distance between vehicle and road to characterise the road handling. In the field of tyre test drives the laser offers the possibility of scanning the tyre surface on a test machine, i.e. the whole tyre surface is measured according to specified drive cycles to examine and document sawtooth formation, erosion, etc. in addition to normal wear. The laser offers other application possibilities in the deformation measurement of the tyre when the vehicle is in motion and the measurement of road surfaces as an important parameter in the development of tyres with respect to aquaplaning and noise behaviour.

