



Vehicle-mounted mobile retroreflectometers provide road operators with accurate data on road marking performance

On the move

How new technology is driving forward progress in the area of vehicle-mounted mobile retroreflectometers

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The need for accurate data on the performance of pavement markings has never been greater. Road authorities are looking to provide suitable safety levels across their increasingly congested roads. Meanwhile, due to the ageing population in many parts of the world, a growing number of elderly drivers are hitting the roads. Compared to young people, elderly drivers tend to have slower reaction times and need more light to see traffic guidance tools such as pavement markings.

It's obvious that the better the optical retroreflections of road markings are, the more visible they are to drivers. Maintaining a good level of visibility is critical to improving road safety.

DELTA's latest LTL-M mobile retroreflectorometer for assessing road marking performance boasts improved accuracy due to its use of new technology. The accuracy is now in line with readings taken with traditional handheld devices such as the company's LTL-X and LTL-XL



models. In technical terms, this means the system works with a typical repeatability of +/-3% and a typical reproducibility of +/- 5%. In addition, the LTL-M offers complete coverage of the entire pavement markings. This is in contrast to the limited, sample-based coverage offered by traditional handheld retroreflectorometers – or even traditional mobile retroreflectorometers. This new product is a major advance on first-generation mobile retroreflectorometers, which were less accurate due to vehicle movement affecting readings and wind and vehicle load variations that affected the measurement geometry. With these older systems, variations of as much as +/-40% have been documented.

The issue of geometry

Most existing mobile retroreflectometers work with 6m geometry. This means that the most accurate measurements are achieved when the system measures at – or close to – the 6m point. During driving, the measurement distance will typically fluctuate between 5m and 7m. If a mobile system is not able to compensate for such inaccuracies, this will result in incorrect readings.

The figure below shows that if the sensor is vertically lifted by 5% or 1.2cm compared to the nominal measurement height, it results in readings of 22% below the correct values. In parallel, if the sensor is tilted 5% off the horizontal level, it results in readings that are 10% too low. The LTL-M is able to eliminate such errors

The LTL-M offers complete coverage of the entire pavement markings up to a speed of 55mph. It is therefore able to measure a detailed cross-sectional retroreflection of the road markings. As many markings have strong transversal variation, a reading taken by a handheld instrument with a 4-5cm wide measurement field in the centre does not represent the true visibility. DELTA's system provides a detailed analysis of the variation that can be correlated to either the true visibility (as the driver sees the marking in full width and length) or to a middle section for correlation to a handheld instrument.

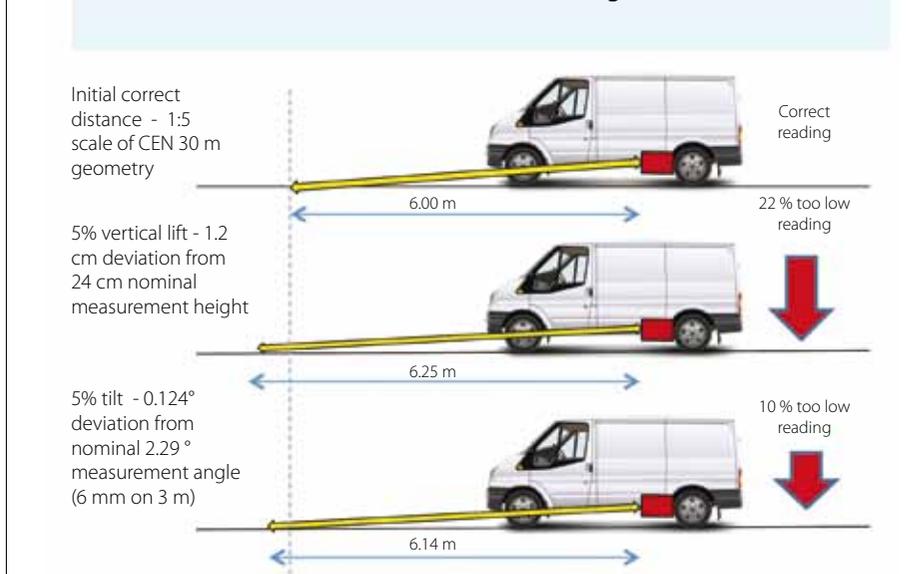


(Above) **Once the LTL-M mobile retroreflectometer unit is attached to a vehicle (as shown below) it can accurately measure retroreflection of road markings at traffic speeds**



The system also offers the opportunity to accurately measure both white and yellow markings automatically without requiring recalibration. Other key features include good linearity up to at least 2,000 mcd/lx/m²; measurement of profiled markings up to 25mm; easy, once-daily field calibration traceable to national standards; and the suppression of daylight to retain measurement accuracy.

- **Retroreflectivity reading errors caused by vehicle movements are seriously affecting the accuracy.**
- **DELTA's LTL-M retroreflectometer automatically compensates for vehicle movements and achieves accurate readings.**



Accuracy as standard

The technology applied to measuring the retroreflection of pavement markings is detailed in various standards, notably EN 1436 and ASTM E 1710. Both standards describe a 30m geometry and the corresponding angles for illumination and observation, focusing on handheld retroreflectometers. The geometry of the existing mobile retroreflectometers follows these standards. There are, however, activities taking place both by CEN and ASTM to expand existing (or indeed write new) standards to cover the mobile measurement of markings. These standards are expected to follow the current 30m geometry. However, they will elaborate on potential error sources of the mobile technology, offer recommendations to the technical specifications of such instruments and possibly even require that instrument suppliers publicly state how their mobile system handle such conditions and what the limitations of their instruments are. This work is expected to be finalised within the next two years. ■