RetroTek-D Transforming Road Marking Retroreflectivity Surveys

One-Pass One-Lane Multiple Assets

Road Marking Dynamic Retroreflectometer

Day & Night Full Lane Width
Vehicle Mounted Retroreflectometer

RetroTek
Reflective Measurement Systems

Now available...

The first independently certified 30-meter geometry dynamic retroreflectometer capable of measuring all road markings across a full lane with the accuracy, reproducibility, and repeatability of hand-held retroreflectometers.

- One pass for one lane
- All legal Traffic speeds
- All markings measured across the full lane width
- Retroreflectivity (RI) and Daylight Contrast ratio of markings
- Road line markings and center lane marking / symbols
- Absence and presence of reflective Markers / RPMs
- Absence and presence of medium barrier reflectors also possible

Designed for a changing road marking industry

The newly available RetroTek-D dynamic retroreflectometer combines the latest Machine Vision and LED projector technology with powerful GPS mapping and video tracking software to transform retroreflectivity road assessment surveys for road maintenance engineers.

- Operational for Day & Night Retroreflectivity surveys
- Full lane width road marking assessment in one pass
- Retroreflectivity (RL) night visibility
- Daylight Contrast ratio measurements
- Right and Left long lines and centre road markings / symbols
- Records absence and presence of RPMs / Studs
- One Operator/Driver
- Mounted to any vehicle capable of taking a front hitch
- No vehicle bodywork integration necessary
- Movable from vehicle to vehicle with front hitch
- Conforms to 30-meter geometry
- Independently Certified to EN 1436 and ASTM E 1710
- Easy to calibrate, operate and process results
- User Friendly QuickView mapping and video reporting software

Introduction

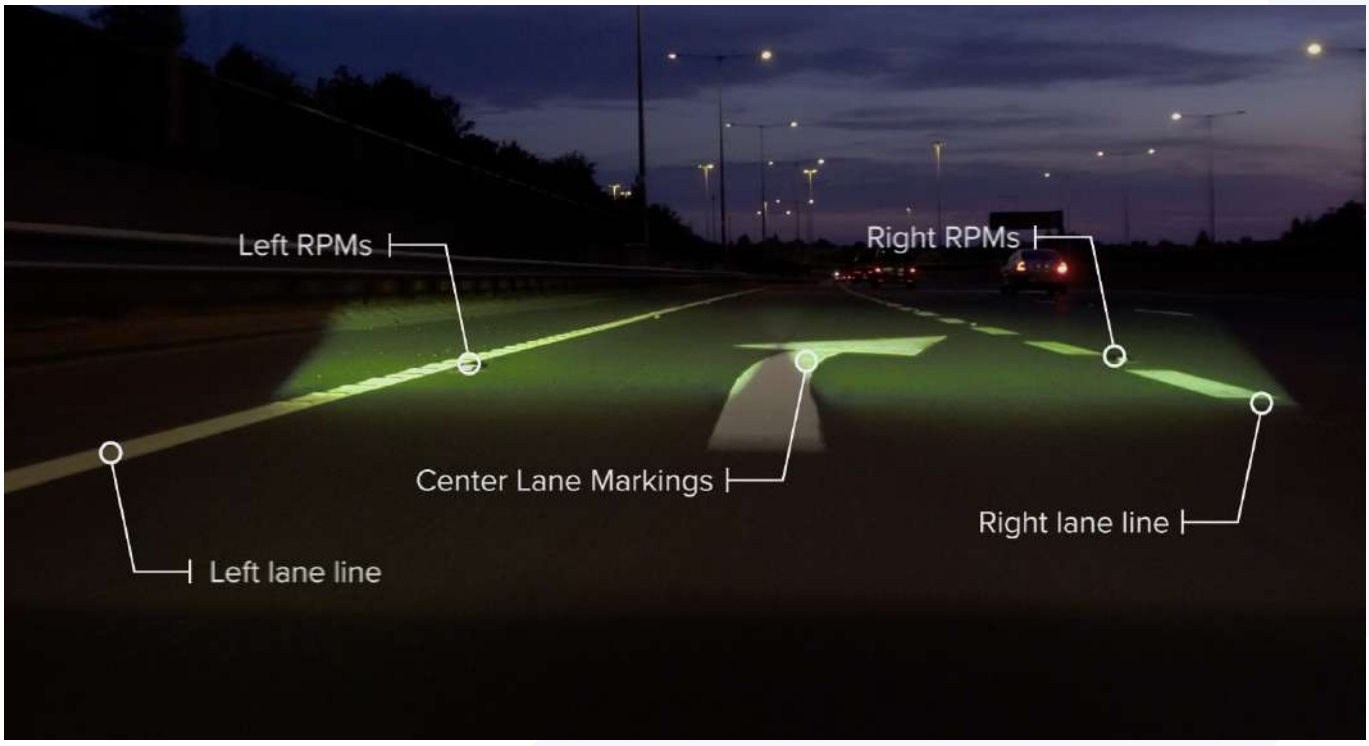
The RetroTek-D mobile retroreflectometer, a new development in retroreflectivity measurement, is designed to be an efficient asset measurement platform which responds to the key challenges emerging in road maintenance to maintain quality and safety standards by providing continuous measurements of road networks at traffic speeds safely.

ADAS and Safety

An increased focus on road safety is accelerating the rollout of Advanced Driver Assistance Systems (ADAS) with over 70% of all new cars to be equipped with Lane Departure Warning systems by 2023. These vehicle safety systems use machine vision technology which rely on good quality road markings to operate safely and efficiently. Vehicle drivers and machine vision systems both require good quality visible road markings by day and night to avoid accidents. This requirement is encouraging road markings globally to support these vehicle safety systems and is being driven by the EU Commission and the FHWA USA in introducing near future and mandatory standardisation of road markings.

Efficiency

Increasingly road authorities internationally are under pressure to reduce the number of road closures for road condition surveys. The road maintenance industry, like many industries is being challenged to demonstrate efficiency, safety for road workers, environmental responsibility, and sustainable maintenance solutions. These forces combined increase the demands on road authorities, road marking contractors and road survey companies to ensure road markings are efficiently and safely maintained.



Key Benefits and Features

Our innovation packed RetroTek-D mobile retroreflectometer could not have come at a better time for the road maintenance industry.

- Keep road workers safe, eliminating road closures, traffic management or traffic flow disruptions by providing retroreflectivity measurements across a full lane width at traffic speeds day or night
- Over 50% reducing in survey costs. Travel distances, vehicle costs and man hours reduced by up to 50%
- Productivity of road markings measurement increased by up to 100% as both left and right lines of lane assessed simultaneously
- Marking assessment provides significant savings for road maintenance authorities on road restriping costs. Surveys allow predictive maintenance with accurate data, GPS tagging and video recording demonstrating corrective maintenance needs
- Ensuring the safety of survey operator / driver and other road users with a front mounted sensor with no side protrusion. This eliminates the need to leave the vehicle for frequent geometric alignment checks and the repositioning of sensitive survey equipment from side to side of the vehicle, associated with side mounted single mounted systems
- Reduces carbon footprint by up to half as survey travel distances and times are halved

Multiple road asset condition measurement:

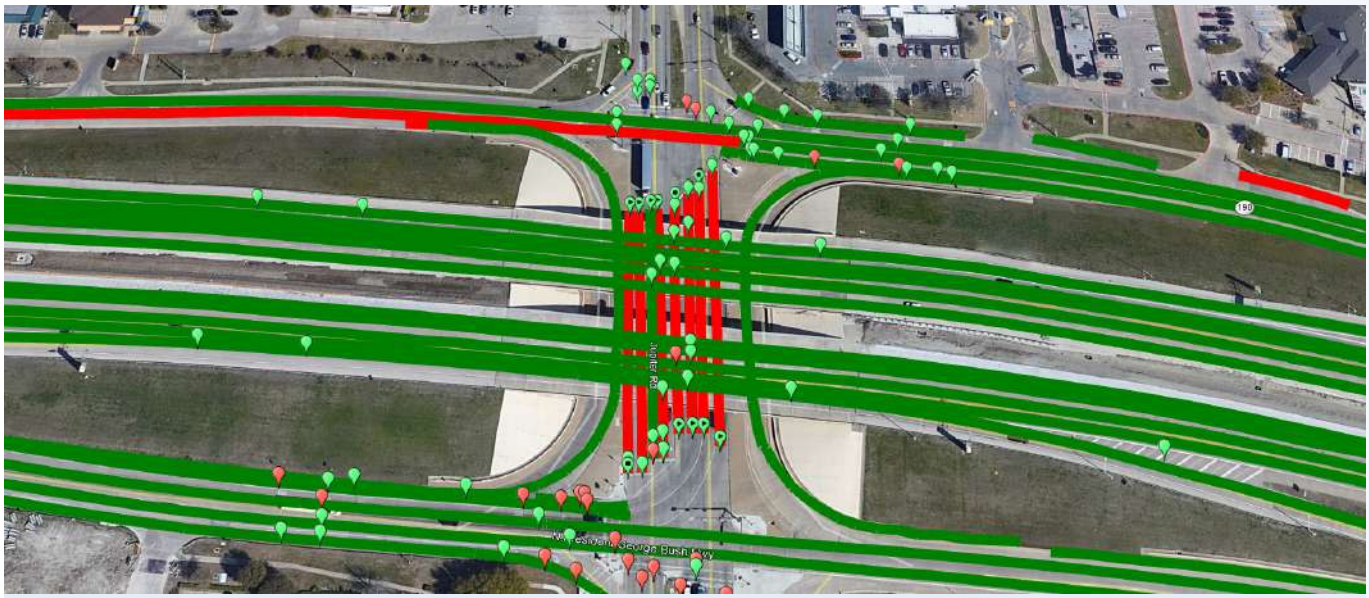
The RetroTek-D can be mounted to the front of most vehicles and survey road markings at traffic speeds while simultaneously accessing up to six reflective road assets in one pass. Independent tests have verified that the RetroTek-D accurately measures in day or night the night visibility RL (coefficient of retroreflected luminance) of pavement line / striping markings. The presence and absence of Pavement Markers (RPMs) / road studs can also be recorded. The system uniquely measures the retroreflectivity (RL) of both right and left longitudinal lines (edge and centre lines) and centre lane marking / symbols in one pass. This is not possible for side mounted systems without the need of road closure / traffic management and or multiple journeys / passes. During day surveys, the daylight contrast ratio between the road surface and road line marking is also recorded.

Accuracy & Repeatability:

The RetroTek-D instrument operates with an accuracy of typically +/-5% and a repeatability of typically less than +/-3%, which is equivalent to the accuracy of handheld retroreflectometers and single-line mobile systems. Measurement accuracy is independent of vehicle speed and ambient lighting conditions. Unlike some side-mounted single-mounted dynamic retroreflectometer systems, the RetroTek-D has built-in automatic compensation for bright sunlight, shadows and road glare, vehicle bouncing from uneven road surfaces and level variations due to accelerating / braking or variations in road line profile height.

QuickView-Pro Reporting Software

Displaying multiple survey results on maps



Survey Start	Central Marking (Pass)	0.1 mile section (Pass)
Survey End Point	Central Marking (Fail)	0.1 mile section (Fail)

Reliability:

The RetroTek-D requires minimum maintenance as it contains no moving parts and designed and built for reliability in tough working environments with prolonged use over many continuous hours and thousands of miles / kilometers.

It uses HD digital cameras and long-life LED light projectors (no laser safety issues) with temperature monitoring. The system includes a remote diagnostics facility for remote service and easy software upgrades and well suited for use by all infrastructure engineers and professionals in the maintenance of reflective road assets.

Full Road Lane Data Recorded:

As well as measuring the retroreflectivity (RL) of road markings under dry and wet conditions by day and night, daylight contrast and the absence and presence of RPMs / road studs, the Operator / Driver has the ability to easily tag Line Colour / Line Type and other road conditions using touch screen function buttons on the tablet during the survey.

Double lines can be reported with individual scores or an average for both lines. Measures the retroreflectivity (RL) of all plane and profiled markings with GPS tagged survey data including date, start / finish times, distance surveyed, survey length, vehicle speeds, road name / number, RL, temperature and humidity. Our powerful reporting software system records and stores GPS tagged video images from the integrated camera for road surveillance and post survey reviews using the QuickView Surveys reporting software platform, typically measuring 50 lines per frame i.e.1000 lines per second with 20 video frames per second.

Rapid setup:

The RetroTek-D can be mounted to the front of most vehicles with a front hitch bar or customised front hitch. Calibration is quick and easy and enables the operator / driver to survey at all speeds 0 to 75mph (0-120 km). No vehicle modification is necessary.

RetroTek GUI display

RetroTek GUI Survey Setup Screen

Front Tow Hitch receiver for vehicle fitting

Designed for Safety:

The RetroTek-D is securely fitted to a vehicle with a standard steel front tow hitch bar with no safety or vibration issues associated with suction cups or straps on some types of side-mounted systems. It does not protrude from the side of the vehicle to endanger other road users, cyclists and oncoming or passing vehicles.

The RetroTek-D enclosure has ~ 8”+ (200 mm) ground clearance when surveying, double the clearance of dynamic side mounted systems ensuring good clearance for kerbs, parking stops, speed ramps etc. If necessary, it can be quickly raised higher from the ground when not operational. As a result, there is minimum risk of damage to the equipment itself.

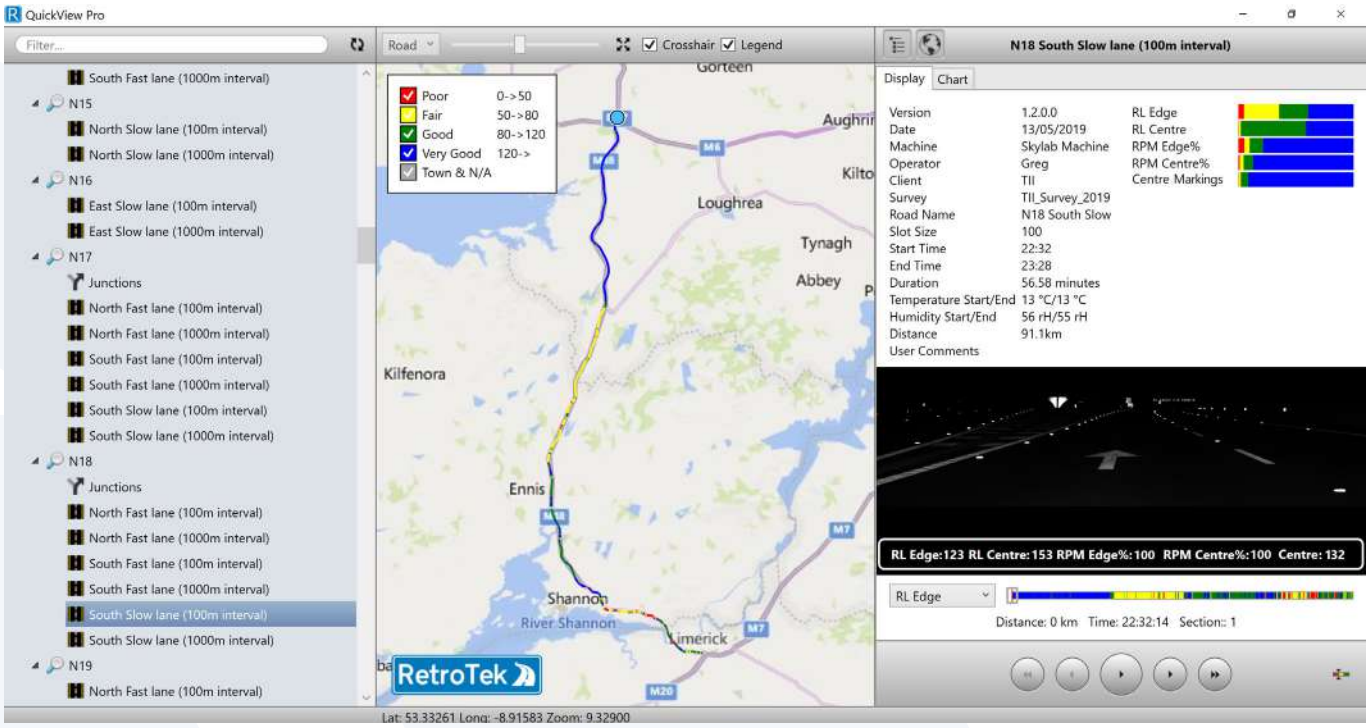
There is no requirement for precision driving close to the line that exist with single-line side-mounted dynamic retroreflectometers as the RetroTek-D is designed for normal lane position driving, providing for safer road marking surveys for both the operator/driver and other road users.

The RetroTek-D software algorithms continuously search and monitor for the lines and centre markings and adjust accordingly leaving the drive/operator to concentrate on driving. All results are displayed live on the Surface-Pro tablet and provides the operator / driver the option of noting incidents with function buttons on the tablet, tagged to the results in reports.

Unrivalled Reporting Software

QuickView-Pro Results Platform

Menu list of all surveys with maps & video for instant analysis



Measurements are processed in real-time and results are available immediately. The QuickView software provides instant reports at the end of each survey showing all results averaged in 100 meter / 100 yard and 1km / 1 mile segments with flexible colour coded performance thresholds in various GPS tagged output formats – csv, kml, shp, pdf and video files. Reports are available on a removable USB memory device.

The specialised QuickView-Pro Software platform includes an indexed menu database of all surveys and provides an Interactive Multiple Survey Reporting and Management Tool to review the results of all assets recorded. The software interface enables the combination of GPS tagged maps with video stills at the same 30-meter geometry viewpoint of all markings and colour coded performance thresholds, all illustrated in one display. Performance threshold can be changed to predict marking wear patterns and result can be integrated into client GIS systems.

Industry Standards

The QuickView software has the potential for future enhancements aligned with customer requirements and the demands that ADAS technologies may require for vehicles to operate safely.

The RetroTek-D conforms to CEN 30 Meter Geometry and independently certified to ASTM E 1710 & CEN EN 1436 by StrAusZert, Test Certificate No. 0913-2020-02 regarding the suitability for measuring the coefficient of retroreflected luminance RL of the surfaces of road markings, as stated in the Test Certificate -

"The RetroTek-D Mobile Pavement Retroreflectometer is hereby deemed to be well suitable for the dynamic measurement of the coefficient of retroreflected luminance RL of road markings according to the measuring geometry and measuring conditions given in the US-Standard ASTM E 1710, in the European Standard EN 1436 and delivers the same results as a portable retroreflectometer. The measuring results are not influenced by the kind, form and colour (white or yellow) of the road markings and are independent of the measuring speed and the brightness of the environment."

Equipment Included. The complete RetroTek-D system consists of:

- The front mounted Sensor enclosure which contains all the survey sensors - HD cameras, illumination LED Projector modules, real-time data processor, GPS, humidity, and temperature sensors. A 12V power cable connects the unit directly to the vehicle battery terminals
- A Surface-Pro Tablet to operate the system from inside the vehicle (connected with an ethernet cable) with graphical user interface (GUI) that assists the driver to calibrate the unit and monitor live data collection. Wireless option available
- QuickView reporting software platform
- System Installation & certified operator training (subject to Covid-19 travel restrictions)

Technical Specifications

Measuring Geometry	30 Meters. According to CEN Geometry. CEN EN 1436 and ASTM E 1710
Observation Angle	EN 1436: 2.29°, ASTM E 1710: 1.05°
Illumination Angle	EN 1436: 1.24°, ASTM E 1710: 88.76°
Width of measuring field	Across lane width ~ 16ft (4.88mts)
Measuring distance	In front of vehicle ~ 39ft (12 Mts)
Measuring speed - minimum	No Minimum
Measuring speed - maximum	Evaluated to 75 MPH (120 KM/H)
Measuring range RL	0 – 2,000 mcd·m-2· lx-1
Reflective Pavement Markers	Measures and counts presence and absence
Double Lines	Measures and reports each line individually or combined
Marking line width	Measures the night-time visible width
Driver display	Microsoft Surface Pro
Camera rate	20 Frames per second
Measurements Per Second	50 lines per frame = 1,000 lines per second
RL Accuracy	Typically, + / - 5%
RL Repeatability	Typically, + / -3%
GPS System	Multi constellation GNSS. Reads GPS, GLONAS, Galileo and Baidu
GPS Accuracy	Accurate to about 2.5mts. with UDR (untethered dead reckoning) Works in long tunnels
Light source	Customized LED Projectors
Working life of the LEDs	~ 5,000 operating hours
Output results formats	GPS Tagged, CSV,KML,SHP, PDF & Video files
Video Format	HD Video Mono Chrome
Connection to laptop	Gigabit Ethernet Cable
Image output	Monochrome image stream
Day Contrast	Day Time Contrast - ratio of marking to background road surface
Operating temperature	32°F - 131°F (0°C to 55°C)
Storage temperature	5°F - 140°F (-15°C to 60°C)
Humidity Range	85% Non-condensing
Dimensions (L x W X H)	~ 42 X 9 X 14 inches (107 x 22 x 36 cm)
Weight of unit	~ 55 LBS (25 KGS)
Standards	ASTM E 1710 & CEN EN 1436
Vehicle Suitability	Fitted to front of vehicle capable of taking a front tow hitch bar
Vehicle Mounting	Standard 2" Square Front Tow Hitch Bar, customizable
Power Requirements	12 Volt Standard. No vehicle power modification required
Dust / Water Proofing	Ingress protection rating: IP66

RetroTek
Reflective Measurement Systems

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