



Traffic Technology





Dear Reader,

VITRONIC technologies contribute to greater mobility and enhanced safety world wide. For many years our focus has been on machine vision technologies for vehicle detection, identification and classification. As a result of our substantial experience in this sector we have established two product families: TollChecker and PoliScan.

The TollChecker family of products provides the basis for the successful toll collection and enforcement, guaranteeing and improving mobility. On motorways and country roads, in cities and at tolling stations, vehicles are detected, identified and classified fully automatically.

With machine vision systems from the PoliScan family, public authorities, government agencies and private service providers are all contributing to improved safety. A wide range of digital systems provides fully automated traffic enforcement and aids the adjudication of offences.

Over half of our employees are engineers, who continuously develop our technologies and in doing so create new areas of application. One example of this is vehicle classification, which forms the ideal basis for monitoring and counting traffic. As a core component of access control, license plate recognition is playing a more and more important role for security considerations.

Benefit from our innovative, successful products and our many years experience. We look forward to working with you.

Yours faithfully,

Dr.-Ing. Norbert Stein
General Manager





Detection

The reliable identification and tracking of vehicles is the basic prerequisite for successful toll enforcement.

TollChecker technology detects and tracks all vehicles, including those tailgating and traveling adjacent to each other – even through lane changes, with heavy traffic, during the day, at night, and under adverse weather conditions.



TollChecker technology in use on multiple parallel lanes ...

Identification

TollChecker technology identifies international and interstate license plates with a very high level of reliability. It can also recognize colors. Even during poor weather, bright sunlight and snow, VITRONIC achieves extremely high license plate recognition rates. VITRONIC is the technological leader in industrial machine vision and has focused on automatic license plate reading since its founding.



... in cities ...



... and on single lanes, for instance at a toll booth.

Mobilit



Mobility through Tolls - Safe, Fair and Comprehensive Enforcement promotes High Acceptance

Classification

Reliable vehicle classification is essential for toll collection and enforcement. TollChecker technology provides full three dimensional (3D) classification. Along with the measurement of vehicle length, width and height, the number of axles and the presence of trailers are detected. Roof racks with bicycles and roof boxes are identified as such and therefore do not result in incorrect classification. VITRONIC has been using 3D measuring technology for many years in other areas as well: at international logistics companies, in the automotive industry and for precise human body scanning.

Communication

Both infra-red and microwave DSRC communication modules that support international standards are integrated into our TollChecker systems for vehicle communication. These modules are provided through major international partners. Transaction and evidence data can be transferred to back-office systems or to mobile enforcement vehicles through established communications technologies, using either cable based or wireless connections. Widely accepted cryptographic measures for encryption and signing can be applied to this data transfer.

Tolling systems are being applied all over the world to expand and maintain infrastructure. The mobility of all road users has a high priority. Exact toll collection and enforcement are prerequisites for tolling systems to be accepted by both users and the general public. The systems must operate safely, fairly and comprehensively. A high level of automation and high efficiency are further important factors. These goals must be achieved with freely flowing traffic, and a minimum of additional technologies such as On Board Units (OBU) and roadside installations.

TollChecker Technology for all Tolling Systems

VITRONIC has the building blocks for every tolling system. The most modern TollChecker technology can cover all elements of efficient and automated toll enforcement and collection: vehicle identification, vehicle tracking, classification, identification and communication. VITRONIC technology can be integrated into all tolling systems.

All core technologies that are used in the toll collection and enforcement systems have been directly developed by VITRONIC. This means that we are able to offer our customers made-to-measure solutions through intimate knowledge of all hardware and software system components, and the capability to supply these to the highest technological standards. A further benefit is that rapid and cost effective maintenance are designed into the systems from their inception. Exceptional customer service standards complement these leading edge technologies.

Two examples clarify the wide ranging application possibilities for TollChecker technology:



Three Dimensional Vehicle Classification at Toll Booths: From Manual to Automatic Enforcement with TollChecker^{avc}

The precise classification of vehicles is also a prerequisite for the efficient collection and enforcement of road tolls at toll booths. This is the only way that toll operators are able to achieve rapid processing and reduce transactions costs for each payment. TollChecker^{avc} is an automatic, laser based classification system that reliably determines each vehicle's class and makes it available in real time for immediate calculation of the payable toll. TollChecker^{avc} generates a 3D model of every vehicle, counts axles and determines additional relevant information, such as the vehicle height and whether a trailer is present. It identifies vehicle roof racks and even separates tailgating vehicles. Large trucks can be classified after the first eleven meters (36 ft) of the truck has passed the classification point.

TollChecker^{avc} is installed adjacent to a lane on a single pole – without additional in-road equipment such as induction loops. The system is tailored specifically to upgrading of existing tolling installations to new technologies.



Mobilit



TollChecker^{freeflow}:

Multi-lane Toll Collection System in Freely Flowing Traffic

In the German truck tolling system, VITRONIC technology supports unconstrained traffic flow and thereby the highest levels of mobility. 300 stationary gantries monitor approximately 1,000 lanes of traffic, without impeding the flow of traffic. TollChecker^{freeflow} reliably identifies national and international license plates on multiple parallel lanes, irrespective of the speed or the position of each vehicle. Trucks are concurrently classified according to size, number of axles and trailers. Within a fraction of a second, TollChecker^{freeflow} matches measured data with the data from vehicle On-Board-Units (OBUs) where these are present and/or communicates with back office systems to allow manual matching if required.

As a key benefit over competitor's solutions, TollChecker^{freeflow} is able to operate with just a single gantry per location, requiring neither roadside cantilevers nor in-road equipment, thereby allowing quick construction without significant interruption to traffic. A logical modular design also simplifies maintenance and servicing, allowing very high availability levels to be achieved.

Extensive statistics can be derived from the data that TollChecker gathers, which can additionally be used in further fields of application:

- Section Control or Point-to-Point speed measurement, which enables entire sections of road to be enforced.
- Travel Time Management, that provides traffic and speed statistics over long route sections
- National security, e.g. the identification of 'Wanted Cars'
- Performance measurement and auditing of tolling systems





Road Traffic Safety with Digital Speed Enforcement

The new generation of speed enforcement equipment is both multi-lane and multi object capable, and creates digital incident records. With these capabilities, PoliScan^{speed} from VITRONIC is already contributing to improved road safety, particularly in traffic zones where previous generations of systems could not be deployed.

Motorists speeding in heavy traffic and on multi lane freeways can now also be held to account, as PoliScan^{speed} ensures that all vehicles visible in its tracking zone are detected and measured concurrently. The measured speeds of infringing vehicles attributed to the correct vehicle, even where multiple vehicles are traveling side by side. PoliScan^{speed} can also be relied upon to take accurate measurements at road works, in bends, tunnels and road sections with poor visibility.

Reliable Evidence

This new and efficient speed enforcement system operates irrespective of the time of day, weather or traffic levels. PoliScan^{speed} ensures that the incident records provide an unbroken chain of evidence and are valid before a court of law. A certified digital signature and encryption protects the incident record against data manipulation and prevents unauthorized access. As an option, GPS location data can be automatically included in the incident record. PoliScan^{speed} also monitors the calibration interval internally and will not operate if it has expired.

Each incident record contains all case relevant data: the single image with exceptional resolution allows a driver to be identified and the license plate to be read. The measured speed, speed limit, witness data, location, date/time and other additional data form an integral part of the digital incident record. PoliScan^{speed} ensures that the documentation of each traffic offence is both complete and valid before a court of law.

Safety



Multiple Vehicles on Adjacent Lanes

PoliScan^{speed} reliably detects vehicles and clearly attributes measurements irrespective of traffic volume, the number of vehicles in the detection zone, and vehicles changing lanes.



Tailgating Speeding Motorists

Driving up close to the car in front is no longer a means of avoiding prosecution: PoliScan^{speed} will measure the speeds and generate independent incident record for both vehicles.



At Road Works

Speed enforcement within road works has previously required extensive sidewalk and/or roadside installations. PoliScan^{speed} makes this a thing of the past, and is able to measure through and near roadside barriers.



At Bends

PoliScan^{speed} also offers proven effectiveness at bends and in sections of road with poor visibility.



In Tunnels

Conventional radar devices may not be used in tunnels due to multi-path reflections preventing accurate attribution of measurements to specific vehicles. PoliScan^{speed} uses tracking, time-of-flight laser speed measurement which is not susceptible to multi-path reflections.

PoliScan^{speed} Fixed

The fixed version of the Poli-Scan^{speed} enforcement system also measures multiple vehicles traveling adjacent to each other, clearly attributes measurements to specific vehicles, and creates digital incident records. Either one or two measurement / documentation units mounted within a single pillar measure the speed of vehicles in both directions of travel – all without any in-road equipment such as loops or piezo sensors. Unobtrusive integration into the urban landscape was part of the design brief for PoliScan^{speed} fixed and the resulting elegant,

inconspicuous design achieves these goals. The pillar is comprised of several segments which can be independently assembled and aligned. This concept enables each measurement / documentation unit to be rotated freely during commissioning of a site prior to fixing. Measurement / documentation units are removable and can be relocated to other pillars. Incident records may be downloaded to back office systems using various protected networks or can be retrieved directly at the pillar using a separate operator interface unit.



Safety



PoliScan^{speed} Mobile

The mobile version of Poli-Scan^{speed} offers maximum flexibility for constantly changing measurement sites. The system is easily installed into either the rear load space of a vehicle or at the front, adjacent to the driver. Alternatively, PoliScan^{speed} may be quickly tripod mounted and operated without tedious site calibration. Of particular benefit to the operator: Poli-Scan^{speed} is certified for unattended use. Erroneous measurements resulting from incorrect adjustment or operator error are prevented through a combination of system design and the inherent capability of the laser measurement system. The measuring and detection system uses state of the art laser technology and requires no additional triggering equipment such as light barriers. A certified digital signature and encryption prevent manipulation and unauthorized access to incident records. Most importantly, PoliScan^{speed} is easy to operate.



Data and Incident Evaluation

Most traffic offences today are still captured on wet film negatives. The transition to digital images – as with PoliScan^{speed} – is however well under way. The subsequent evaluation and adjudication of these images should occur with a minimum of effort and with the highest level of data quality. VITRONIC has been offering solutions in this area for many years.

PoliScan^{office} localizes the vehicle in a digital image and optimizes this information for generation of infringement notices. The overview image, details of the driver and the license plate region are extracted at the maximum quality available in the original image. The VITRONIC software can either extract all of the incident field data from these images or import it directly from the incident records. Database entries such as measurement site or the incident reference number are completed either manually or automatically.

VITRONIC's unique film scanner, Poli-Scan^{classic} has been evaluating black and white negative films rapidly and automatically for many years. Even now it offers a migration path for leveraging existing detection infrastructure with upgraded digital back-office systems.





A Single Unit Solution: Traffic Offence Documentation with ALPR

A single unit that combines enforcement and surveillance functions is a reality today with VITRONIC's PoliScan^{evidence} system. The primary function of documenting red light and speed offences is complemented by optional automatic license plate recognition (ALPR). Detected registration numbers are then compared with a "Vehicles of Interest" list, and an alarm is raised in the event of a match.

PoliScan^{evidence} integrates seamlessly with other PoliScan products; for example with PoliScan^{office} for rapid and efficient evaluation and adjudication of incident records.

Superior image quality, even under inclement weather and adverse lighting conditions is a hallmark of VITRONIC's documentation systems. An unbroken chain of evidence from the moment of incident detection ensures validity of the incident record before a court of law.



Safety

Modern Law Enforcement: Fully Automatic Capture and Reading of License Plates

Around the world, law enforcement agencies are trying to remain one step ahead, to detect and prevent planned criminal activity. Security is playing an ever increasing role. Automatic license plate recognition (ALPR) is a valuable tool in this area. For border protection, national security or as a search tool, this technology is ideally suited to crime fighting. License plate reading systems monitor traffic, automatically identifying licence plates – irrespective of whether a vehicle is traveling at 25 or 250 km/h (15 or 155 mph). With PoliScan^{surveillance} and PoliScan^{smart}, VITRONIC offers two field-tested ALPR solutions for operation on all road types, from quiet back streets to busy interstate highways. In either a fixed or mobile configuration, they automatically locate the license plates of each vehicle in freely flowing traffic, read them automatically and immediately compare them with a “Vehicle of Interest” database. International and interstate licence plates are also decoded with the highest of read rates.

If a match is detected, that is, a captured license plate matches a registration entry in the search or “Vehicles of Interest” database, the alarm is raised. The database contains additional fields for each registration number, such as the reason for its inclusion and what action to take on detection. If necessary, mobile police officers can then step in and intercept the detected vehicle. Images and vehicle data can be directly relayed to mobile police data terminals. Together with further information from the database – such as the vehicle type and color – police officers receive important information to enable effective law enforcement to take place.



Typical mobile deployment sites are bridges over roadways, at the roadside or at border crossings. No costly calibration, light barrier installations or in-road equipment such as induction loops is required for the operation of the license plate recognition system. Invisible infra red illumination means that covert use is possible both during the day and at night. The encrypted transfer of the match data guarantees the secure operation of the system irrespective of whether wireless or fixed networks are employed.

Additional areas that can benefit from VITRONIC ALPR systems are access control and parking applications.



PoliScan^{surveillance} – for Multiple Lanes and High Speeds

PoliScan^{surveillance} is the ideal solution for demanding ALPR situations. The system covers a large range of possible traffic scenarios on multiple lanes and at extremely high speeds. A special laser based detection unit triggers on vehicles in freely flowing traffic. Tailgating vehicles can also be detected and their license plates read, as can those traveling adjacent to each other and even vehicles changing lanes. PoliScan^{surveillance} is also used on roads and freeways in Germany, working at speeds of up to 250 km/h (155 mph). The system is equipped with multiple high resolution cameras and enables the highest detection and reading rates.



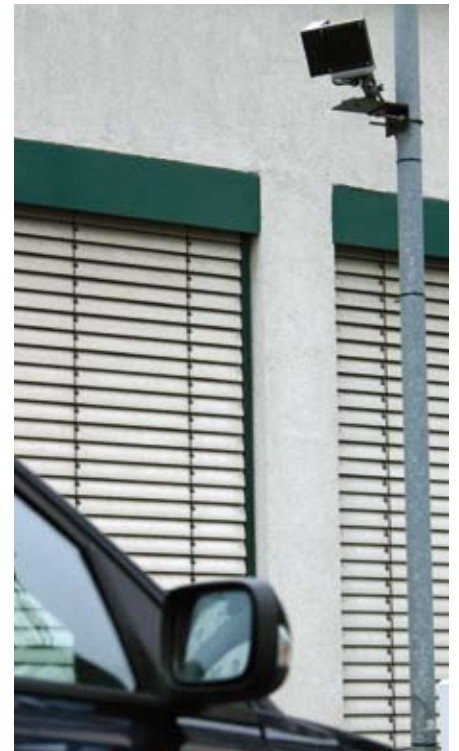
Safety



PoliScan^{smart} – Flexible Design for Concealed Installation

PoliScan^{smart} was specially developed for concealed installations. With its compact design, it can easily be installed within vehicles, integrated into a vehicle's body or for maximum flexibility, mounted on a tripod. PoliScan^{smart} is ideal for the surveillance of up to two lanes with moderate traffic speeds, such as on county highways, in smaller towns and for access control. PoliScan^{smart} identifies license plates on vehicles at variable distances. The system continually acquires images and does not require a separate trigger system. Each image is searched for license plates and all detected plates are read.

PoliScan^{smart} can be shipped with one or two highly sensitive cameras in a protective casing and with up to two flash modules.



VITRONIC worldwide

We now are your direct contact on four continents.
Please contact us, we look forward to your projects.
All contact addresses can be found at www.vitronic.com



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