

Case Study

Toll Enforcement



Mobile Toll Enforcement in Poland

VITRONIC supports the Polish National Revenue Administration with mobile toll enforcement technology to secure revenues and investment scope

Achievements:



High-volume **mobile toll enforcement** **across three lanes** – without interfering with traffic flow



Reliable image acquisition via front, rear and side cameras in all weather conditions, day and night



Automatic number plate **recognition** (ANPR) and **classification** of vehicle type by cutting-edge OCR system and respective sensors / detectors



Matching of captured vehicles with e-Toll **database**

The challenge:

Finding and implementing a reliable mobile enforcement solution for toll roads in Poland

2021 marked a paradigm shift in toll collection for Poland. The government converted the paper ticket payment into a modern GNSS-based electronic payment system. This change also required a novel solution for toll enforcement that would support the new „free flow“ of traffic while securing revenues.

The e-TOLL system, launched in Poland, is based on satellite positioning technology and allows drivers to pay road tolls among others via mobile applications without having to stop at checkpoints or service stations. This facilitates the flow of traffic and the toll payment, but also presents a significant challenge to toll handling – the new solution makes it easy to bypass the payment, whether intentionally or accidentally.

With over 550,000 vehicles already registered in the system in September 2021, a reliable solution for payment enforcement, that could technically keep pace and secure toll revenue, was needed fast. Adding to the challenge of urgency, the Corona pandemic complicated delivery processes of any kind, jeopardizing timely implementation of a solution.

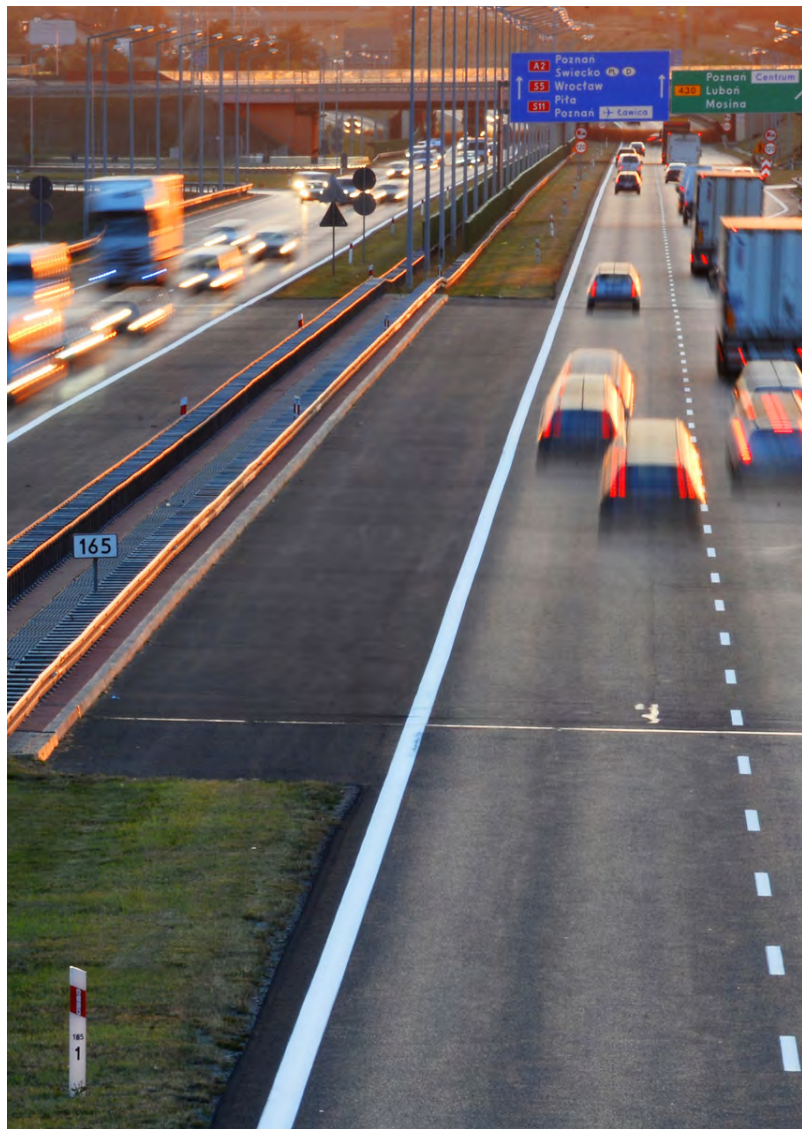
Over 550,000 vehicles registered in the e-TOLL system by the end of September 2021 – a reliable mobile solution for enforcing toll payments was needed as fast as possible

The Client:

Polish National Revenue Administration

The National Revenue Administration, abbreviated KAS from the Polish Krajowa Administracja Skarbowa, is a state administration operating under the “umbrella” of the Ministry of Finance of the Republic of Poland.

The KAS protects the interests of the State Treasury and the customs territory of the European Union and is responsible for revenues from taxes, customs duties, fees and non-tax budget receivables. Therefore the collection of tolls on toll road sections in Poland through the new electronic toll system is one of its key responsibilities.



In order to be able to meet this task, KAS had concrete specifications regarding the capabilities of the toll enforcement solution. The device or system needed to be capable of:



Exchanging data with the new e-TOLL system



Automatically recognizing the number plates of vehicles and their trailers or semi-trailers, as well as classifying them based on their dimensions and shape



Recording via front and rear cameras during passing or overtaking of the captured vehicle or sets of vehicles and linking the recordings from the different cameras



Safeguarding vehicle detection by using additional detectors, alongside camera image analysis



The Solution:

VITRONIC Enforcement Bar for mobile toll enforcement

To comply with KAS requirements and enforce toll payment precisely without interfering with the improved traffic flow brought by the new e-Toll system, VITRONIC supplied 102 patrol cars equipped with its Enforcement Bar – a fully automatic and mobile number plate recognition system (ANPR) that can be installed on top of a patrol car.



Integrated within a state-of-the-art lightbar system, it captures passing vehicles and automatically reads their number plates. Capturing and reading the number plates of vehicles can be performed whether the patrol vehicle is parked or moving at full speed. Both lanes to the right and left, as well as the lane in front of the patrol car, are simultaneously monitored.

The VITRONIC Enforcement Bar – a fully automatic and mobile number plate recognition system (ANPR) that can be installed on top of a patrol car



The Solution:

This solution provided the following features:

- ✓ Automatic number plate recognition (ANPR) and classification of vehicle or sets of vehicle in combination with trailer or semi-trailer via OCR System and a set of sensors: use of infrared illumination and additional detectors on top of cameras
- ✓ High reading rates and precise capture across three lanes simultaneously, in all weather conditions and differential speed up to 250 Km/h
- ✓ Flexible target capture through front, back and side reading, including linking of the recordings from the different perspectives
- ✓ Online data connection to e-Toll system and database matching: automation combined with automatic alerting and suspicious case detection
- ✓ GPS positioning and localization of the captured vehicles

Implementation: **VITRONIC delivers mobile toll enforcement solution despite of difficult pandemic times**

The Polish National Revenue Administration required delivery of the vehicles within a period of four months. One of the first steps the VITRONIC team carried out was to prepare prototypes – from bodywork to equipment and additional functionalities – in order to present them to the customer and refine the features. During several meetings, the requirements stated in the tender were discussed in detail and the configuration of the vehicles was tailored exactly to the customer's needs.

Thereafter, despite time pressure, each vehicle was subjected to detailed drive-through tests to confirm that it met the KPI requirements set out in the tender agreement. For the tests, VITRONIC organized vehicles that were „representative“ of their category, e.g. trucks with trailers, tankers, buses, minibuses and motorcycles, and conducted a record-breaking 46 hours of testing. Altogether, VITRONIC managed to complete the full order even one month before the deadline specified for the last batch. The vehicles were added to the fleet and have since enabled the enforcement of correct toll payment on the toll roads in Poland.



**102 patrol cars
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We always strive for the highest quality standards, which is why, despite deadline pressures, every single vehicle went through thorough, rigorous internal testing to check the functionality of the installed equipment.

Dariusz Koźbiel,
Project Manager
VITRONIC Machine Vision Polska



The Impact: **Effective toll enforcements on Poland's toll roads**

VITRONIC's mobile toll enforcement solution fully meets the required specifications of KAS and contributes significantly to the success of the transition to GNSS-based tolling in Poland. The technologies enable reliable enforcement of toll payment regardless of weather and visibility conditions or vehicle type, allowing the patrol cars to be part of the free-flowing traffic or enforce from the roadside – the perfect fusion of precision and flexibility.

The VITRONIC Enforcement Bar –
High reading rates and precise capture
across three lanes simultaneously, in all
weather conditions and differential speed up
to 250 Km/h



Your Benefits with VITRONICs mobile toll enforcement solution



Capture toll violations in moving traffic –
across up to three lanes



Flexible image acquisition via front, rear and side cameras



State-of-the-art OCR system for automatic number plate
recognition (ANPR) and classification of vehicle type



Matching with customer-specific databases



Legal compliance and data protection

We Are Happy to Help with Your Project



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