



BOSCH

Invented for life

MIC cameras

The smartest investment for intelligent transportation systems

Roadways are one of the most difficult environments for electronic equipment. Extreme temperatures, rain, snow, ice, and salt spray stress equipment housings, while vibrations from truck traffic and debris cast by rotating tires threaten longevity and long-term performance. The challenge for senior traffic engineers and planners is complex. How do you choose the right intelligent video technology to improve mobility, safety, and efficient use of roadways now and ensure the technology chosen has the advanced artificial intelligence (AI) capabilities to serve as a sound and reliable investment as needs change in the future?

The solution

MIC cameras for intelligent transportation systems (ITS) offer a rugged design, high-quality hardware, and artificial intelligence (AI) as a built-in standard. They deliver long-term reliable performance and extremely accurate detection capabilities. Meeting your monitoring and automatic incident detection (AID) needs into the future, MIC cameras are the smartest choice for ITS solutions.

Rugged design

The lifespan for a MIC camera typically exceeds 10 years even when exposed to constant vibrations and road debris impacts. Designed to perform in any environment, the solid metal body withstands:

- ▶ High wind
- ▶ Rain and snow
- ▶ 100% humidity
- ▶ Temperatures from -40° F to +149° F

The superior metallurgy and finish provide exceptional protection against corrosion. With MIC cameras, your investment is protected against the harshest conditions.

Minimal maintenance requirements

An IP68 submersion rating comes without nitrogen pressurization, eliminating costly maintenance and loss of weather resistance. A window wiper clears dust, grime, and salt spray, while the defroster removes moisture.

The heated front glass will melt ice build-up, keeping the camera view clear. You get crisp images for traffic monitoring operations and automated incident alerts, without the need for lane closures and safety risks that come with accommodating maintenance crews.

Video-as-a-sensor technology

Artificial Intelligence (AI) will improve safety and mobility on our roadways, and the latest MIC inteoX 7100i ITS cameras are built on a higher performance processing platform that supports on-board embedded neural-network based video analytic detectors tailored for ITS detection and data. The neural nets are engineered to classify pedestrians, bicycles, motorcycles, cars, trucks, and buses.

Highly accurate detection is the foundation, enabling important AI use cases, including:

- ▶ Slow vehicle detections
- ▶ Stopped vehicle detections
- ▶ Traffic queues and congestion
- ▶ Vehicles traveling the wrong way

The active on-board analytics processing transforms the cameras from world-class video monitoring devices to multipurpose sensors that automatically alert to these safety risks and other traffic events, plus generate comprehensive data on vehicle and vulnerable road user (VRU) movements for historical roadway use analysis.

“We have had a MIC camera installed at a site near the location of another manufacturer’s camera for more than a year. While the other camera has needed repairs and reconfiguration, the MIC camera has worked flawlessly. It has been rock solid for us and our customer. The video analytics included with the camera has made our detection and tracking of vehicles seamless.”

Jimmy Fontaine
Vice President ITS and Smart Cities
Transportation Control Systems, Inc



Reliable performance in ITS

MIC cameras are the smartest investment for intelligent transportation systems. They offer innovative features that ensure reliability and durability with minimal maintenance -- lowering the total cost of ownership and improving sustainability for ITS solutions.

All-metal gears and brushless positioning

All-metal intermeshing gears provide:

- ▶ Greater resistance to shock and vibration
- ▶ Longer operational life compared to cameras with plastic gears and rubber belts

A high-efficiency solid-state motor with brushless positioning also ensures continuous operation without significant wear and tear or troublesome camera positioning slip.

Anti-backlash drive-train

The unique anti-backlash drive-train braking system offers benefits that include:

- ▶ Enhanced pre-position and tracking accuracy
- ▶ Improved optical image stabilization performance when the cameras are installed on poles subject to vibration or shaking



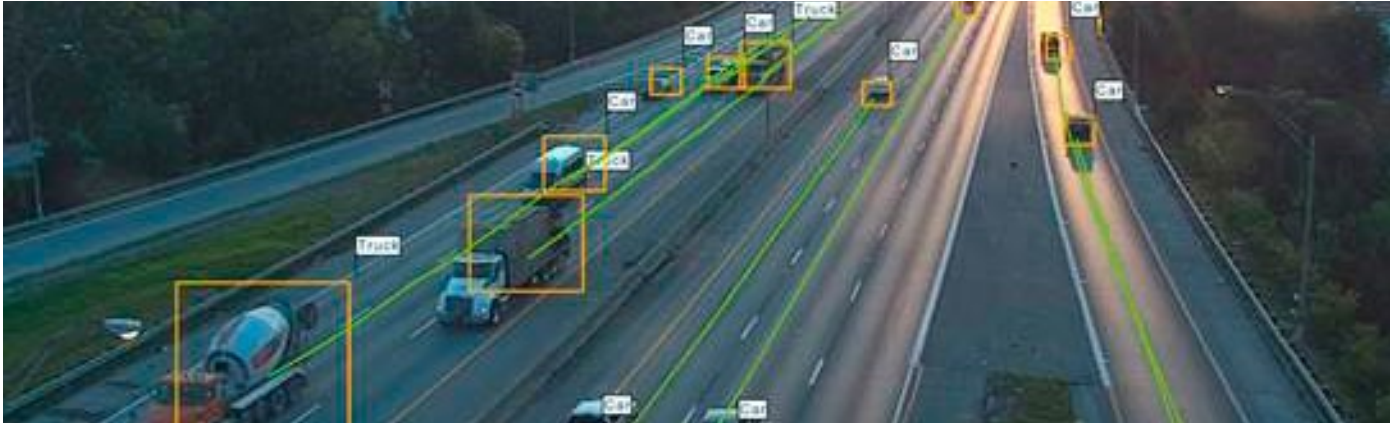
Closed loop positioning

The cameras never need recalibration. If exposed to a heavy shock or external force, like gale force winds, the positional encoders:

- ▶ Send feedback to the control software to correct any errors
- ▶ Steer the camera back to the exact pre-programmed positions

The camera never loses positioning, returning to presets with unprecedented accuracy.

The true advantage of MIC cameras is their combination of rugged design with built-in Intelligent Video Analytics designed for the most demanding environments. MIC inteox 7100i ITS cameras feature Traffic Detector software, developed on deep neural network-based video classifiers.



Detection accuracy exceeds 95%

Traffic Detector improves detection capabilities in congested scenes with deep learning algorithms that use embedded neural networks to mimic the human brain, allowing it to learn from large amounts of data and recognize patterns to tackle complex detection tasks more accurately. It enables counting of overlapping vehicles queued at traffic lights or in dense traffic jams, while ignoring common disturbances caused by:

- ▶ Vehicle headlights
- ▶ Shadows
- ▶ Extreme weather
- ▶ Sun glare and reflections

With high precision detection, accuracy levels extend beyond 95% – a necessary threshold for ITS safety applications.

Extend beyond safety

The on-board AI advancement enables each camera to serve as an individual sensor that gathers rich data for informed decision-making. MIC inteox 7100i ITS cameras classify objects and generate comprehensive metadata that is streamed independent of the video. Data from camera deployments can be aggregated in the Bosch ITS Data Service, where it is optimized and made available for analysis of vehicle and VRU traffic patterns. This historical data helps traffic engineers better understand roadway usage to manage volume, mobility, and safety.

By updating camera software, improved or new detectors can be added, all working with Bosch's growing selection of analytic rules and algorithms for a future-proof solution.

“The MIC IP camera is exactly the right solution for ITS applications. They are robust and have held up well in extreme heat and when installed on pier caps and bridges in a corrosive saltwater atmosphere. With the video analytics capabilities, the cameras also have everything they need to future-proof an installation.”

Tom Halpin
Chief Technical Officer
IndustrialEnet



MIC cameras for ITS applications

All MIC cameras have what it takes to deliver the highest quality, relevant video images - regardless of lighting conditions, time-of-day or object movement. Because they are future-ready, you can rely on them to deliver a return on your investment for many years to come.

Introducing the MIC inteox 7100i ITS

This revolutionary camera runs on the INTEOX open platform and enables customized ITS solutions with the on-board neural net-based Traffic Detectors. With its enhanced classification capabilities, the MIC inteox 7100i ITS version is our leading camera for automatic incident detection and data capture solutions. MIC inteox 7100i ITS offers:

- ▶ 2MP or 4K UHD resolutions
- ▶ Starlight technology for capturing color detail even when light levels drop to almost zero
- ▶ Optional integrated IR and white light illuminators
- ▶ NTCIP support

MIC cameras: A proven solution

Infrastructure projects are highly visible expenditures. Considering the total cost of ownership for ITS hardware investments should be an important factor in the decision-making process. Frequent maintenance, repair or replacement of cameras increases costs over the life of the system, pose a safety risk for maintenance personnel, and may affect public perception of the project's success.

Make the safe choice for your ITS projects. Trust Bosch MIC cameras that are relied upon for proven and enduring performance in challenging roadway installations around the world.

For more information on MIC cameras for ITS, contact intelligent.transportation@us.bosch.com



MIC inteox 7100i

Bosch Security and Safety Systems

Protecting lives, buildings and assets is our aim. Our product portfolio includes video security, intrusion detection, fire detection and voice evacuation systems as well as access control and management systems. Professional audio and conference systems for communications of voice, sound and music complete the range.

Visit [boschsecurity.com](https://www.boschsecurity.com) for more information.
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