

Crystal-Clear in Complex Light: How AUTOEQUIPS Camera Monitor System Enhances All-Weather Vision Safety



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In the daily operation of commercial vehicles, a driver's field of vision is highly susceptible to interference from extreme lighting and complex weather conditions. These elements often trigger severe visual blind spots and misjudgments, remaining core hidden hazards that induce traffic accidents. Whether navigating through heavy highway traffic or busy urban intersections, drivers rely heavily on clear visual feedback. However, traditional optical setups frequently fail under adverse environments.

Specific operational pain points illustrate how abrupt light changes and weather compromise visibility:

- **Night Driving:**High-beam headlights from trailing vehicles directly strike traditional physical rearview mirrors, generating intense glare that temporarily blinds the driver's rear perspective.
- **Tunnel Entry and Exit:**When entering or exiting tunnels, or facing strong counter-light during morning and evening rush hours, drastic changes in light intensity create harsh glare and stark contrast, making it difficult for the driver's eyes to quickly adjust and perceive details in shadowed areas.
- **Rain and Snow Weather:**In heavy rain, snow, and high-humidity environments, physical mirror surfaces are prone to water accumulation, fogging, and even freezing. Combined with low-

illumination environments, this further strips away a driver's perception of road conditions.

To resolve this industry challenge, [AUTOEQUIPS](#) leverages its extensive experience in optical imaging and artificial intelligence technology since its establishment in 2000, establishing itself as a trusted China [Camera Monitor System](#) Manufacturer. By introducing advanced digital viewing solutions, the company addresses traditional mirror limitations. As a professional China Camera Monitor System Manufacturer, AUTOEQUIPS delivers the Camera Monitor System (CMS) designed specifically to overcome these hurdles. Backed by nearly 100 patents and international certifications such as ISO 26262 and ISO 21434, AUTOEQUIPS provides all-weather, high-definition, reliable visual support for medium-to-heavy trucks and buses, comprehensively upgrading driving safety in complex scenarios.

Wide Dynamic Range and Low-Light Imaging: Improving Detail Recognition in Complex Light

Under scenarios involving drastic light changes, such as nighttime driving, intense glare, or tunnel counter-light, standard cameras easily suffer from the phenomenon where dark areas are completely black and bright areas are completely white. To maintain operational safety, a reliable Camera Monitor System must possess robust wide dynamic range and low-light capture capabilities. Without these advanced imaging attributes, drivers lose crucial reaction time during critical transit moments.

AUTOEQUIPS addresses this requirement through advanced optical engineering. Its advanced Camera Monitor System products—such as systems equipped with the CM60EX camera—support an ultra-wide dynamic range (WDR) of up to 140 dB and a minimum illumination of 0.1 Lux. This configuration intelligently balances highlight and shadow areas, effectively suppressing glare caused by the headlights of trailing vehicles.

Consider a scenario where a large bus or heavy-duty truck travels on a nighttime highway, or transitions from a dark tunnel into outdoor spaces with direct, intense sunlight. The system automatically balances the lighting, clearly restoring dynamic traffic details in the rear and side-rear zones. This consistent visual clarity allows fleet drivers to monitor surrounding traffic without being blinded by sudden brightness or hindered by deep shadows.

Environmental Protection and Lens Heating: Mitigating Rain, Snow, Fog, and Frost

Commercial vehicles frequently shuttle through diverse extreme climate environments. Therefore, the waterproof, anti-fog, and wide-temperature adaptability of camera modules serve as critical factors determining a fleet's all-weather operational reliability. Moisture and sub-zero temperatures can quickly compromise conventional exterior equipment, making robust physical protection essential for continuous operation.

The AUTOEQUIPS camera modules feature an IP69K waterproof and dustproof rating, with an operating temperature range covering -40°C to +85°C. Furthermore, the lenses integrate heating and anti-defogging functions, allowing them to operate reliably in freezing cold or scorching heat.

In pouring rain, heavy snow, or sudden temperature drops during severe winter road conditions, the lens heating feature helps minimize condensation and frost build-up, ensuring clearer vision in cold and humid conditions. Across a cumulative 269 million kilometers of multi-national actual road driving experience—spanning diverse climate regions including Europe, the United States, and China—the system has demonstrated exceptional durability and stability, ensuring video continuity in harsh weather.

Display and Operational Reliability: Picture Readability, Continuity, and System Self-Check

During prolonged operations and bumpy road conditions, the signal transmission stability and fault self-diagnosis capabilities of vehicle-mounted electronic equipment are paramount. Commercial fleets demand uninterrupted data streams to maintain situational awareness across thousands of miles of transit.

The system features comprehensive system failure detection and self-inspection functions, supporting dual CAN bus transmission. The video response time is maintained at just 35 milliseconds, ensuring low-latency, high-frame-rate image presentation.

During bumpy long-distance logistics transportation or complex urban trunk road operations, the rugged anti-vibration design helps ensure stable mounting and reliable connections across camera terminals and display screens. This robust reliability significantly reduces equipment failure rates, minimizes fleet downtime caused by electronic system maintenance, and safeguards efficient daily operations.

Configuration and Application Conditions: Field of View, Applicable Models, and Regulations

Deploying an advanced digital vision system on commercial fleets requires more than just core imaging capabilities; it demands optimized spatial coverage, flexible hardware adaptability, and strict adherence to global safety standards. To ensure optimal performance across diverse operational environments, AUTOEQUIPS carefully tailors its hardware configurations and certification compliance to match the specific structural requirements and legal standards of commercial transport fleets.

1. Field of View (FOV): Expanding Vision and Blind Spot Coverage

Due to their long bodies and large vehicle dimensions, commercial vehicles make it difficult for traditional rearview mirrors to fully cover side and rear visual dead zones. A reasonable field-of-view design serves as a vital condition for reducing blind spot hazards.

The AUTOEQUIPS CMS system—equipped with lens modules such as the CM50EX and CM60EX—provides optimized Class II and Class IV field-of-view (FOV) combinations, helping drivers better perceive traffic conditions on the side and rear of the vehicle. When performing lane changes, turning, or reversing in narrow road sections, the system promptly captures vehicles or pedestrians traveling in adjacent side-rear areas.

2. Applicable Models and System Hardware Configuration

To accommodate different installation architectures and display requirements of various commercial vehicles, AUTOEQUIPS offers diverse system display and control components.

The system can adapt to the 12.3-inch AHD display DM12AS or the LVDS high-frame-rate display DM12D. In the public transit and bus sector, it pairs with modules such as the 9-inch display TM90A/DM90D, providing flexible hardware solutions for distinct vehicle types, including truck transportation and bus & coach operations.

3. Regulatory Certifications

The complete Camera Monitor System solutions by AUTOEQUIPS have passed multiple rigorous standards, including the EU UNECE R46 indirect vision regulation, UN R10, and UN R118. They

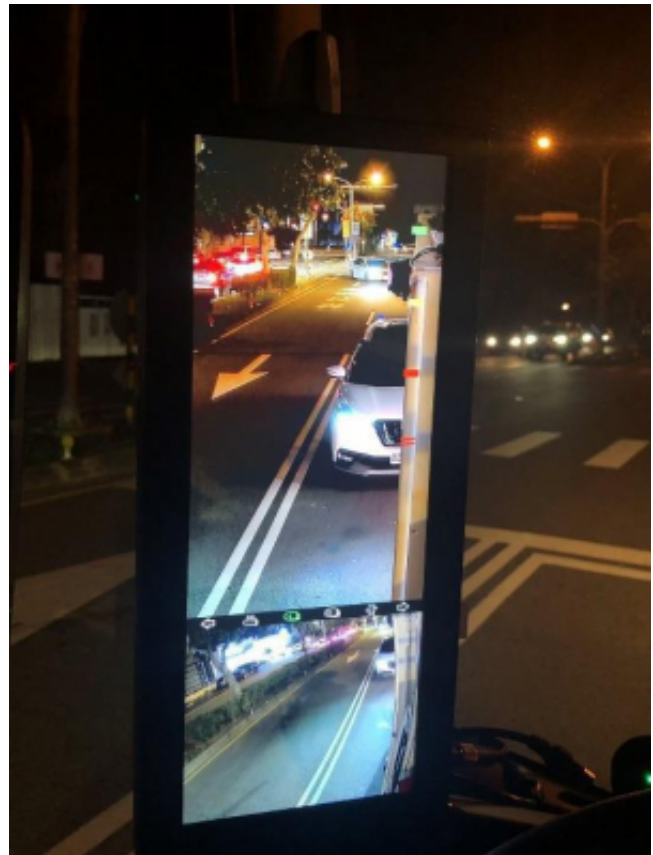
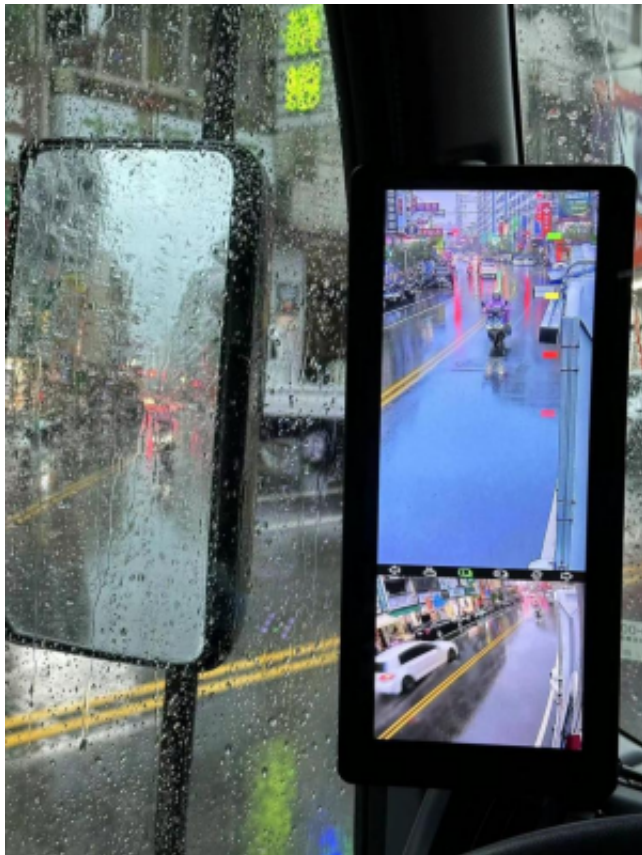
comply with China's GB 15084-2022 "Performance and Installation Requirements for Indirect Vision Devices of Motor Vehicles" as well as indirect vision regulations in Taiwan, China. Additionally, the system follows the SAE J3155 technical specification and has obtained US NHTSA exemption approval, offering globally compliant indirect vision safety guarantees for commercial vehicle clients worldwide.

Conclusion: Echoing Driving Observation Needs and Enterprise Service Support

The essence of commercial vehicle safety lies in empowering drivers with clear and stable visual observation capabilities. Whether facing nighttime glare, strong counter-light, or complex lighting and adverse weather such as heavy rain, ice, and snow, the AUTOEQUIPS Camera Monitor System assists drivers in accurately grasping road dynamics around and to the side-rear of the vehicle, effectively reducing safety risks caused by visual fatigue and observation blind spots.

Because of this reliable performance, the CMS solutions developed by AUTOEQUIPS have been adopted by numerous mainstream global commercial vehicle manufacturing enterprises and fleets. This solid cooperative relationship is built upon a foundation of rigorous functional safety and high-quality hardware delivery.

To ensure long-term operational success, the enterprise maintains a professional and efficient pre-sales and after-sales service team capable of providing high-quality customized solutions tailored to the specific application scenarios of our partners. The team responds rapidly to assist in resolving technical challenges, ensuring that every project lands smoothly. For more technical details regarding the Camera Monitor System or to discuss fleet video safety upgrade solutions, please visit the official website to obtain support and connect with our team: <https://www.autoequips.com>.



Media Contact

AUTOEQUIPS TECH CO., LTD.

*****@psvt.com.cn

<https://www.autoequips.com>

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