

## Use of Camera Monitoring Systems to Satisfy Regulatory Mirror Requirements



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Replacing exterior rearview mirrors with camera-based systems has been a desire of manufacturers and consumers alike for quite some time<sup>[1]</sup> Camera Monitor Systems (CMS) have been integrated into vehicles in the form of 360 degree and birds eye view displays, rearview camera systems have become standard equipment for most automotive manufacturers, and yet, traditional exterior rearview mirrors still have not been replaced with CMS. Rearview mirrors (and more specifically, the required visibility and safety features provided by rearview mirrors) are governed in the United States by Federal Motor Vehicle Safety Standard (FMVSS) No. 111, which is enforced by the National Highway Traffic Safety Administration (NHTSA). While no recent action indicates that the NHTSA is close to amending FMVSS No. 111 to allow for CMS to be used as an alternative to and replacement of exterior rearview mirrors in the United States, minor steps towards such a change have been introduced and manufacturers continue to develop IP, both in CMS and in hybrid-CMS (where CMS is used as a *supplement* to regulatory compliant exterior rearview mirrors). As such, it is important to be aware of potential regulatory changes (and differences in regulations in foreign markets) that may affect the direction of the evolving technology space. This article seeks to briefly explore the possibility of a change in U.S. regulations that would allow CMS as a replacement for exterior rearview mirrors, the benefits provided by CMS as a *supplemental* vision system, and any effect the current state of U.S. regulations (i.e., of delay) may have on consumer offerings in this technology area.

On October 10, 2019, the NHTSA published an advance notice of proposed rulemaking (ANPRM) indicating that the agency was seeking public comment on permitting camera-based rear visibility systems as an alternative to the traditional exterior vehicular rearview mirrors that are required under FMVSS No. 111<sup>[2]</sup>. The publication in the Federal Register indicates that the ANPRM was made in response to rulemaking petitions from manufacturers seeking to replace exterior mirrors with CMS.

Proponents of the use of CMS over traditional exterior rearview mirrors cite enhancements to vehicle aerodynamics (and thus increases in vehicle fuel economy and decreases in vehicle noise) and safety as main drivers for the push toward fully camera-based visibility.<sup>[1]</sup> CMS cameras generally have a smaller profile at the exterior of the vehicle as compared to mirrors and can display their captured images at screens inside the vehicle. Additionally, CMS can provide a wider, less obstructed, and more

informative (i.e., digitally enhanced) view compared to traditional mirrors. However, the ANPRM states that the NHTSA, before promulgating a rule change, is seeking to determine whether CMS can provide at least the same level of safety as the rearview mirrors currently required under FMVSS No. 111. The NHTSA appears to have set a high hurdle for a rule amendment, having published research in the area as recently as October 2018 that identified aspects of CMS performance that caused concern. The concerning aspects of CMS performance included excessive blooming and lens flare from headlights of other vehicles during night travel and blurred and obstructed images due to rain droplets on the camera lens.[2] While these may seem like relatively minor hurdles for motivated manufacturers, and despite the 650 comments received during the ANPRM's two month receiving window[3], the NHTSA does not appear to have received or developed evidence to support allowing replacement of rearview mirrors with CMS.

This is despite the fact that the NHTSA recognizes that CMS has been effectively approved as a safety equivalent to rearview mirrors in some foreign markets. For example, the ANPRM indicates that the International Organization for Standardization (ISO) published performance requirements for CMS that have been incorporated into the United Nations Economic Commission for Europe's (UNECE) Regulation No. 46 to permit CMS as an alternative to mirrors in dozens of countries in which UNECE No. 46 is in effect. In other words, some markets outside of the U.S. would currently allow vehicle offerings where the exterior rearview mirrors have been entirely replaced by CMS.

At least for the time being, CMS are only available to drivers in the United States as *supplements* to traditional exterior rearview mirror systems rather than *replacements*. Nevertheless, vision systems that use CMS to supplement rearview mirrors still provide tremendous value to drivers and manufacturers alike. For example, as noted by the ANPRM, "an overwhelming majority of vehicle manufacturers voluntarily exceed the minimum rearview mirror requirements set forth in FMVSS No. 111," such as by providing rearview mirrors that far exceed the required size and field of view under the regulations. Manufacturers can, and have already begun to, provide hybrid systems that incorporate a smaller-than-normal (yet still regulatory compliant) exterior rearview mirror with a separate CMS display providing an additional or enhanced view.[1] Thus, manufacturers can provide noise reduction and fuel savings due to a more aerodynamically efficient design while providing the wider views typically provided by larger exterior mirrors and while increasing safety through the enhanced vision capabilities of CMS.

Such hybrid systems, of course, provide both technical and strategic advantages over their CMS-only counterparts. For example, the regulatory compliant mirror provides a fail-safe backup plan should the electronic CMS portion of the system fail for any reason. Additionally, a manufacturer's choice to only offer hybrid-CMS options in all markets helps to reduce production complexity and ensure global compliance (e.g., should a CMS-only jurisdiction reverse course). While CMS-only offerings have their own unique advantages, manufacturers and consumers can still find plenty of value in the hybrid-

CMS market. Accordingly, because U.S. regulations have not quite caught up with the offerings of the technology space, it is important to monitor regulatory practices of the relevant markets and consider whether developing technologies should be considered in ways supplemental or tangential to traditional rearview mirrors.

In other words, while CMS-only rearview vision systems appear to be the way of the future and while they have garnered approval in several foreign markets, evidence suggests that because U.S. regulations have not yet been revised to allow such systems, a full-fledged market switch may still be on the distant horizon. By way of example, UNECE No. 46 was amended in 2016 and yet only a few vehicles equipped solely with CMS appear to have been made commercially available since. Whether the lack of CMS-only vehicles in these markets is due to consumer preference, difficulty in satisfying the ISO standards, or economic (e.g., hesitation on the part of the manufacturer to sell a vehicle with an option only regulatory compliant in a few markets) is impossible to tell. Notable, however, is the appearance of these foreign markets to continue to follow technology trends dictated by U.S. regulations despite being governed by more forgiving regulations of their own. What will be interesting to follow is, as CMS technology inevitably continues to improve in quality and decrease in price, will the gap in CMS offerings in markets governed by UNECE No. 46 grow? And would such a disparity drive significant change in practice between the U.S. and these jurisdictions?

[1] The ANPRM cites petitions from Alliance and Tesla to allow CMS as a compliance option for FMVSS No. 111 dating back to 2014.

[2] The ANPRM describes FMVSS briefly as including the requirement that all passenger cars be equipped with inside and, “at least on the driver’s side, outside mirrors. The mirrors must be mounted according to certain specifications, and must provide the driver with a specified minimum field of view. The FMVSS No. 111 requirements relating to rearview mirrors have been largely unchanged for several decades.” (Vol. 84, No. 197, Oct. 10, 2019, 54533–54542). <https://www.federalregister.gov/documents/2019/10/10/2019-22036/federal-motor-vehicle-safety-standard-no-111-rear-visibility#footnote-12-p54535>

[3] <https://www.forbes.com/sites/jimhenry/2019/10/15/replacing-rearview-mirrors-with-cameras-would-benefit-the-ears-as-well-as-the-eyes/?sh=2353fef23a2>

[4] [https://www.nhtsa.gov/sites/nhtsa.gov/files/documents/13640-sidevisibilityreport\\_102518\\_v3-tag.pdf](https://www.nhtsa.gov/sites/nhtsa.gov/files/documents/13640-sidevisibilityreport_102518_v3-tag.pdf)

[5] <https://www.regulations.gov/document/NHTSA-2018-0021-0005/comment>

[6] <https://www.magna.com/company/newsroom/releases/release/2020/10/27/news-release---magna-s-clearview-camera-monitoring-system-to-debut-in-2022>