

FICOSA's comments to the working document IGCMS replacement mirrors

Ficosa International, S.A. has analyzed the working document entitled "IGCMS-03-02 working document replacement mirrors Rev 1.doc". This document results from the meetings of the metrology group and IGCMS which took place on 9th and 10th September 2009.

According to our understanding, the aim of this document is to put forward an amendment request of the ECE Regulation No. 46 "Uniform provisions concerning the approval of devices for indirect vision and of motor vehicles with regard to the installation of these devices", which will lead to the replacement of mirrors by camera monitor systems (CMS).

Firstly, we will like to highlight that FICOSA is the leading company of a company group formed by several companies based in many countries all over the world, all of which mainly operating in the Automotive sector, but not only, since recently FICOSA has broadened its activities to other sectors such as Aeronautics, Security & Defence and Health.

In this sense, FICOMIRRORS a subsidiary of FICOSA is mainly devoted to design, development, manufacture, distribution and commercialization of rear view systems, including exterior mirrors and lighting systems for mirrors. Besides, FICOSA's recent joint venture has led to the incorporation of ADASENS AUTOMOTIVE which core business is focussed in the design, development and manufacturing of advanced driver assistance systems (ADAS) by using mainly camera systems and image processing.

In light of the foregoing, FICOSA is as many other leading companies which are promoting the subject amendment proposal, also interested in fostering the installation and use of camera monitor systems in vehicles.

Nevertheless, as we will explain hereunder, Ficosa International, S.A. questions certain the points contained in this proposal mainly due to safety reasons, which are particularly apparent for Class II and Class III mirrors, the Main Exterior Mirror.

Concerning the amendment proposal that would affect to Class I and Class IV mirrors, FICOSA International agrees with its content.

As indicated above, FICOSA considers that this amendment could lead to an increase of the number of accidents and drivers will even lose the mirrors' benefits (particularly, parking will become more difficult, thus we suggest that parking-aid cameras shall be mandatory).

In addition, FICOSA highlights that there will be for sure a critical period in which drivers will not be used to the limitations of the new systems during the term in which such systems will be introduced in the market.

FICOSA draws the attention to the following main drawbacks which the subject amendment presents:

1. Using camera monitor systems will decrease drivers' 3D perception of the surroundings of the vehicle. The binocular (two-eyed) human vision system captures two different views of a scene and then the human brain compares both and obtains the information of the depth. This effect is especially important in distances less than 6 meters in which drivers will not have the same level of depth perception. This fact will have consequences in distances/relative velocity perception and could influence negatively in the vehicle manoeuvres (especially lane changes, overtaking, traffic circle, highway entrances, driving in cities and narrow streets).
2. The Field of View (FOV) of drivers may be reduced by using camera monitor systems, if the same technical requirements laid down in the current ECE R46 apply to these alternative systems. Thus, the FOV obtained with a mirror is variable and could be adapted by the driver by changing its head position. It is particularly important depending on the manoeuvres the driver has to do. According to the regulation at stake, it is mandatory to fulfil a specific FOV depending of the mirror class. This FOV represents a minimum and only with an easy head movement with the current mirror systems the FOV can be amazingly increased exceeding the legal requirements. This fact provides a strong safety improvement. If the FOV requirements for camera monitor systems are maintained as defined in the current ECE R46, the driver will have a quite smaller FOV than he has in the present conditions by using standard mirrors and consequently driving will be less safe.

Nevertheless, FICOSA shares the opinion contained in IGCMS and ISO draft documents that it will be necessary to define accurately the minimum functional requirements that these camera-monitor system must fulfil, should this amendment proposal be accepted.

In this regard, FICOSA considers that there are also other technical issues or questions that the amendment proposal and related documents should have to take into account and regulate, such as:

1. Monitors position should be adjustable to different driver's percentiles and taking into account HMI studies.
2. Monitors should permanently show the FOV.
3. Define the monitors' size according to geometric proportions between real and imaged object fixed and ergonomic and safety studies.
4. Ambient luminance (i.e. night, sunlight, headlamps glare, etc) should be considered when defining camera monitor systems sensibility, which may require the use of High Dynamic Range image (HDR) cameras.
5. The failure mode and field issues of cameras may be higher than mirrors.

6. Test requirements for cameras and monitors.
7. Minimum acceptable motion blur of cameras required to assure safety conditions.
8. A new definition of the “critical object” due to the change of perception of FOV with cameras.
9. Fulfil the end lifetime Directive (recycling)

In brief, all the above mentioned questions as well as the analysis of the HMI (ergonomic and psychological aspects) studies should be considered with a view to assure a good definition and implementation of this technology.

In view of the foregoing, FICOSA believes that to date the replacement of mirrors by camera monitor systems requires bigger efforts in R&D and implementation activities with a view to avoid inconveniences such as FOV reduction, less 3D perception, lose of image quality, lower reliability rate and functional requirements not clearly defined yet.

However, FICOSA supports the fostering of camera monitor systems for automotive purposes in conjunction with the use of standard mirrors until the market proves that both drivers and technology are ready to face the replacement of the current standard mirrors by such technology on same safety levels.

Mollet del Vallés, October 9th, 2009