Daytime Running Lights for Motorcycles – an Idea and Research Proposal

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By now you have probably noticed that the headlight units of new Audi cars on Australian roads have two strips of bright white lights illuminated during the daytime. These are daytime running lights (DRLs). The European Commission has decided to require dedicated white DRLs on new cars in Europe from 2011 and Audi has introduced them well ahead of the deadline.

Since 1997 DRLs have been fitted to all General Motors cars in the USA and they have been mandatory on Canadian vehicles since 1989.

Holden Special Vehicles is now advertising the safety benefits of DRLs that are standard on the sporty E2 Commodore. These comply with Australian Design Rule 76 for optional DRLs.

In 2003 I conducted research on DRLs for the NRMA and was surprised to find how effective they would be in Australian conditions. This research included analysis of various types of vehicle lights for possible use as DRLs and referred to photometric theory, traffic signals research and road design practices. That same year Paul Thompson from General Motors published an SAE paper on the change in crash rates of General Motors models after they were fitted with DRLs. That study confirmed my own photometric analysis and showed that DRL effectiveness is correlated with lamp signal range (see chart below). Importantly it found a noticeable positive effect with bright yellow turn signal DRLs that are fitted to about half of the GM cars.

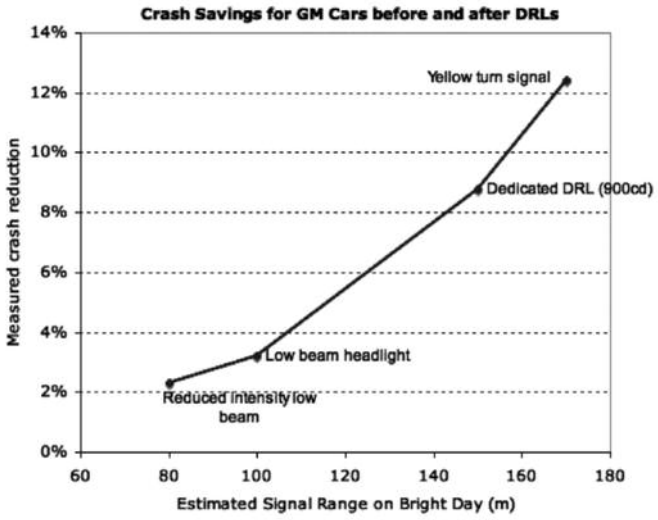
It can be seen that the GM research also supported my finding that low-beam headlights perform marginally as DRLs under most daylight conditions. To prevent glare at night the regulations set a maximum headlight intensity of 437 candela in the direction of oncoming motorists. On a bright day headlights at this maximum have a signal range of about 100m, which is less than the recommended minimum road design sight distance for an intersection on a 60km/h road. This helps to explain the so-called latitude effect, where early studies of the daytime use of low-beam headlights found stronger benefits in high-latitude countries like Norway.

The same marginal performance can be expected from low beam headlights on motorcycles. Much brighter lights are needed to make motorcycles stand out under most daylight conditions.

Bright Yellow Turn-Signal DRLs

There has been relatively little work on motorcycle DRLs in recent years. Based on the GM research findings, in 2005 I co-wrote a paper recommending that bright yellow turn signals (luminous intensity about 1000cd) be considered for use as DRLs on motorcycles. This was published in the proceedings of the 20th International Conference on the Enhanced Safety of Vehicles (ESV). However at that time I was unsuccessful in obtaining research funding to develop this concept further and to conduct some closed-road trials.

Some motorcycle groups in Europe have complained that DRLs on cars will make motorcycles less conspicuous. It seems to me the obvious answer is to fit well-designed DRLs to motorcycles. This year the BAST road research organisation in Germany has been trialling some possible DRL systems for



motorcycles but, unfortunately, they did not include turn signal DRLs in their on-road trials.

It is acknowledged that bright yellow turn-signal DRLs on motorcycles would be novel in Europe (and Australia) and it would take a little time for motorists to understand their meaning. However, they would quickly come to understand that two yellow lights meant that a motorcycle was approaching and that speeds and distances needed to be judged differently to cars (because the motorcycle lights are closer together). I do not agree with the argument that car drivers would take greater risks if they know the approaching vehicle is a motorcycle - motorcyclists are much better off if the other motorist knows they are different.

Another major advantage of turn-signal DRLs is that the direction of turn is unambiguous at a much larger range. With a single turn signal that, on a motorcycle, is necessarily close to the centreline of the vehicle the direction of turn may not be evident until the motorcycle is quite close. With turn signal DRLs (as with GM cars) one light stays on and so the flashing of the other light instantly indicates the direction of turn. Added to this is the fact that most current motorcycle turn signals are likely to be near the minimum regulated brightness and have poor signal range on bright days - replacing them with 900cd yellow lights would result in a vast improvement.

Finally, recognising that many motorcyclists and motorcycle manufacturers are loath to fit anything extra on the front of motorcycles, the concept of replacing current turn signals with brighter yellow DRLs would be easier to "sell" to these groups than fitting additional lights.

The latest designs of dedicated DRLs are very promising and, like the Audi cars, use energy-efficient light emitting diodes (LEDs).

Conclusion

There exists a unique opportunity to improve motorcycle conspicuity through well-designed DRLs. It is recommended that the potential for bright yellow turn-signal DRLs be examined for this purpose.