



NIGHT DRIVING SAFETY AND EFFECT OF RETROREFLECTORY OR OTHER REFLECTING ELEMENT DURING NIGHTTIME DRIVING

¹Rajshri Bhaisare, ²Vishal chandrakar

¹M. tech student, ²Assistant professor

¹Department of civil engineering

¹shri shankracharya technical campus, Bhilai (C.G.), India

Abstract: Night time driving is associated with lack of visibility, darkness, fatigue, and fear. At that time reflecting element installed at road, head light of vehicle and street light on road play important role to guide road user safely and comfortably to his destination. Road traffic sign board are graphical language that can be easily decoded by road user. They not only represent impending road condition but also give idea about current danger, difficulties, obstruction to make journey convenient. This study highlight uses and essential of retro reflecting element during night time driving. Reflectiveness of material depend upon its grade, luminous, shine, light reflecting property, head light of vehicle, angle of illumination, color of head light and color of reflecting material. We found that glass bead in resinous paint, technically known as thermoplastic road marker having good reflective output if head light incidence over it. Other improvement maybe use of fluorescent sign board rather ordinary one, because they are more captivating for eyes. Anti-glare device and screen reduce eye strain due to light coming from opposite lane. It makes journey safer and easier.

Index Terms – Accident, Night time driving, Reflection, Retro reflectories, Road user, Road, Light, Traffic.

I. INTRODUCTION

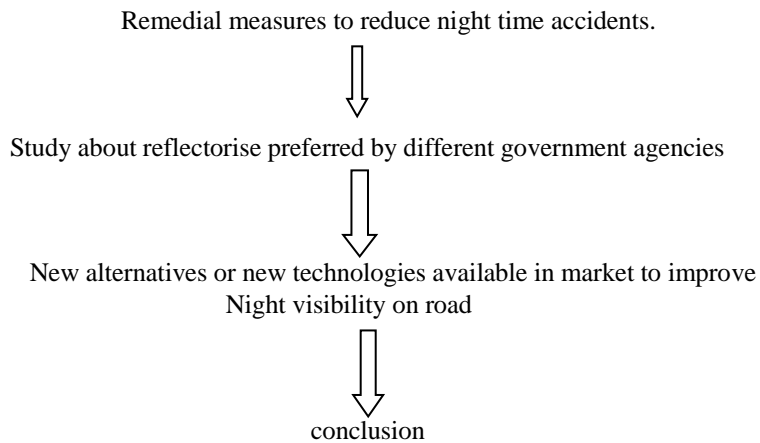
In this world a basic means of connectivity is transportation. And it is a process which is carry out 24/7. during day time the sun light is present hence it is easy to travel by using different transportation means but during night the major issue is visibility specially when we are talking about road network. In our country India, there 4 basic modes of transportation i.e. road rail airways and waterways. In our country road/highways are most frequently used transportation facility. Which also affected from largest number of accident and fatal injuries among any of the other mode of transportation. Most of this accident are due to poor visibility less lighting and fatigue of driver and this major causes are hits very high on night time hence night time road accidents are increasing day by day. statics says that night accidents are more during night time and its around more than 60 % in India. According to Hindustan times they reported that road accident are increased 4% during night time between 2019 to 2023. Poor visibility have broad spectrum to study it's about driver's vision, tiredness, mental status, anger, fear.

Weather is also play important aspect during night driving. foggy weather or rainy nights are reduce visibility of driver also the fatigue during night enhance is effect on human body which may cause inconvenience for driver himself and other pedestrian. Other factor of poor visibility on night are absence of illumination, no proper marking on obstructions, lack of information.

In India most of the highway are black top which may give poor experience during night if proper measures are not taken by authorities.to improve the night visibility in black top surface it is essential to adopt different retroreflectors and reflecting elements such as strut, pavement marker, reflective tape etc.

II. METHEDOLOGY

This study will done to know the difficulties, causes and remedial measure during night driving and know the discomfort to driver during night and how to reduce the same. As the research area is about difficulty during night driving visibility, for that we drive different frequently use vehicle on road of district Durg state Chhattisgarh country India. This road are state highway, major district road and village road owned by state public works department. We use 4-wheel vehicle and 2-wheel vehicle to study about night driving difficulties. There remedial measure and provision done by authority to reduce night time accident.



1. Remedial measures to reduce night time accident:-

1. traffic controlling authority like traffic police are always carry breath alcohol testing device to maintain or punish drunken driver. The fear of traffic police make road user not to drink and drive.



Fig. 1: - Breath analyser

2. Spread knowledge about proper and effective use of head light during driving. It can be responsibility of vehicle seller to give proper information of different function on vehicle deeply.



Fig. 2: - High beam low beam function of vehicle

3. Road lightning should be maintain by authority, replace low lamps during annual repair period.
4. Spread awareness against fear during night driving.as a traffic engineer by reducing Night driving accident and ensuring safety during night road user move freely without any fear.



Fig. 3: - Traffic awareness park

5. Avoid night driving if driver is sleepy or tired, this initiation may safe road user from fatal accident. If its important to drive at night make sure that driver is taking proper rest before driving.
6. Local authority may have to aware cattle owner that their cattle should be resting on their stall not on road. This initiative reduces major of road accident during night and also save animals from unwanted accident.
It should be responsibility of local body like panchayat and gram Sabha that stray animal including dog which basically stay in their region, maybe listed and they should wear proper reflecting band on their neck. This initiative saves both road user and animal.
7. During night driving pedestrian are not clearly visible if proper lightening is not on road. Hence it is advisable to pedestrian for at least their safety they should wear bright clothes or reflecting clothes to recognise properly. If clothes are dark in colour they should carry reflecting band, reflecting strip on back or reflective strip on front.



Fig. 4: - Aware Cyclist with reflecting back

8. From traffic engineer point of view proper placement of lamp, sigh board, reflector, and object marker should be on road which are not only useful on day time but also functional at dark night.



Fig. 5: - Proper placement of sign board

9. Proper lightning and gated level crossing should provide as much as possible; this initiative reduce collision not only human and train but also the animal roaming surrounding to rail track.
10. Arboriculture helps to reduce glare effect of vehicle coming from opposite direction. It help smooth traffic flow on road without any eye strain.



Fig. 6: - Arboriculture

2. Study about reflectorise preferred by different government agencies: -

2.1 Thermoplastic

- A mixture of glass beads, pigments, synthetic resin, and fillers that is heated and applied to the road. Thermoplastic markings are durable and reflective.
- In india basically following colour road marking are use as per IRC 35-
 1. White- widely use in India as centre line marker or edge marker as its visibility and adaptability by eyes are more as compare to another colour.
 2. Yellow- IS colour no. 356 are using as yellow colour for road marking. It is basically showing message to restrict crossing of traffic and parking.
 3. Blue- use for non-conventional markings, like bus rapid transit corridor, urban streets etc.
 4. Green – use to show bicycle and non-motorised transport means, To priorities them on road.
 5. Red/ purple- use to convey hazardous message to road user.



Fig. 7: - Thermoplastic

2.2 Reflective sheeting

Available in different levels of reflectivity, including engineer grade, high intensity prismatic, and diamond grade cubed.

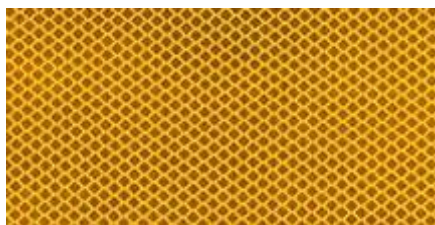


Fig. 8: - Reflective sheeting

2.3 Reflective pavement markers

These markers are made of plastic or metal and contain reflective substances. They can be used for lane lines, traffic islands, and more.



Fig. 9: - Reflective pavement marker

2.4 Reflective Road studs

These studs are made of plastic, aluminum, ceramic, or glass and can be solar-powered.

Following road studs use in India as per IRC 35 –

- White colour- to give idea about traffic lane and centre line of roadway.
- Red colour- use to indicate edge of pavement. Basically, this stud plays important role during night driving to give idea to road user about edge of carriage way.
- Yellow colour- use to indicate right side edge of pavement. Basically, give idea about median side edge line.
- Green colour- this road stud are showing crossable edge for lay byes.



Fig. 10: - Reflective Road studs

2.5 Road delineators

Roadway indicators are popularly called as Delineators or Guide Poles. It is basically a form of guide posts made of Mild steel with pure polyester powder coating with the minimum thickness of powder coating of not less than 40 micron for protection against corrosion. The surface should be concealed so that there should not be any exposed surface without powder coating.



Fig. 11: - Road delineator

2.6 Median marker

Flexible Median Marker (FMM) should be used for improving median visibility during dark hours. Use of Median Marker provides safety against collision happening with medians during night time or severe weather. Flexible Median Markers shall be provided with fluorescent yellow colour retro reflective sheeting Type XI.



Fig. 12: - Median marker

2.7 Object marker

This Aluminium-backed flexible prismatic sheeting shall be made of yellow coloured flexible prismatic sheeting with non-metallic prismatic lens formed in a transparent, synthetic resin as retro reflective elements. This flexible prismatic sheeting shall have black and yellow stripes with aluminium backed flexible prismatic Type VI sheeting conforming to ASTM: D4956 specifications and standards of coefficient of retro reflectivity, flexibility and impact resistance applicable for reboundable device.



Fig. 13: - Object marker

2.8 Reflective tape

This tape was originally developed for roadways and contains small glass beads to increase reflectivity.



Fig. 14: - Reflective Tape

2.9 Aluminium Composite Materials (ACM)

ACM sheets used for sign boards is a sandwiched construction with a thermoplastic core of 'Low Density Polyethylene' (LDPE) between two thick skins/sheets of aluminium with overall thickness of 4 mm and 3 mm, and aluminium skin thickness of 0.4 - 0.5 mm and 0.25 - 0.3 mm respectively on both sides. The retro reflective sheeting must be applied on the top surface with aluminum surface with recommended surface preparation from sheeting manufacturer. A fluorocarbon coating may be applied over the exposed surface of aluminium to ensure corrosion resistant and weather proof and thus shall conform to relevant ASTM.

The mechanical properties of 4 mm and 3 mm ACM.



Fig. 15: - Aluminium composite materials

2.10 Solar raised pavement marker

Made of polycarbonate molded body with circular shape, solar powered LED self-illumination in active mode, 360-degree illumination and reflective panel with micro prismatic lens capable of providing total internal reflection of the light entering the lens face in passive mode. Should possess self-charging mode.



Fig. 16: - Active solar raised pavement marker

3. New alternatives or new technologies available in market to improve: -

3.1 • Glass bead technology

Glass bead is considered as spherical which can reflect back light emitted over it.

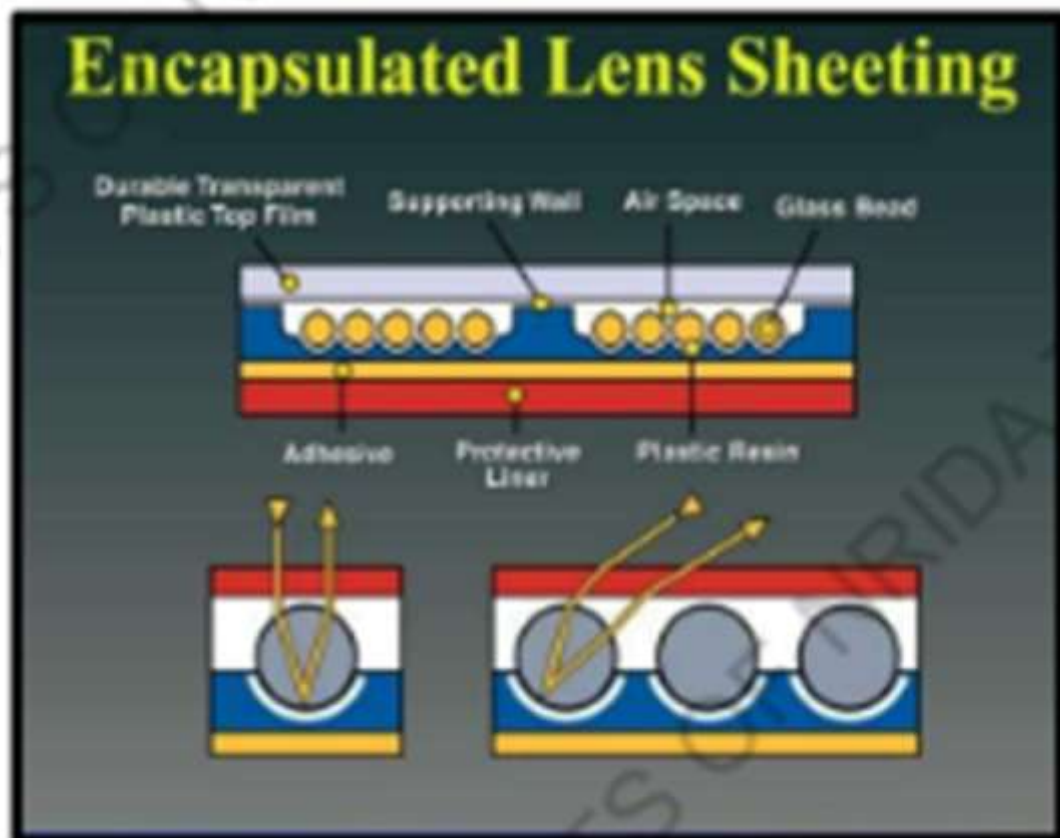


Fig. 17: - Glass bead technology

3.2 • Micro prismatic technology

This are nothing but glass, cut in prismatic shape to use reflecting property of glass as prism.

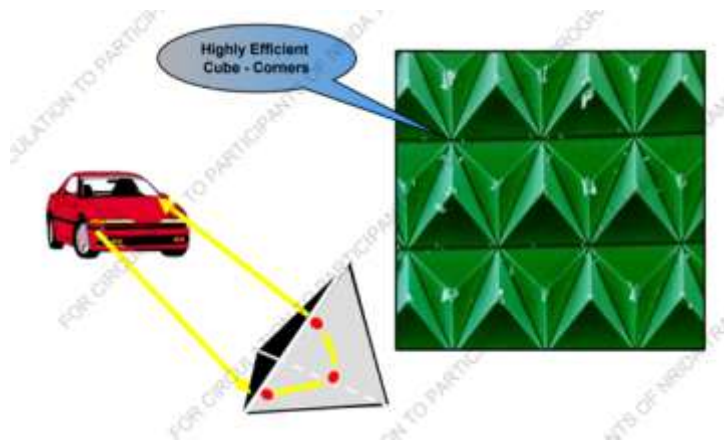


Fig. 18: - Micro prismatic technology

3.3 • Fluorescent sign board

Use of fluorescent sign board instead of standard sign board, as it gives more illumines than standard. Fluorescence picks rapid attention at dull and dark weather.



Fig. 19: - Fluorescent sign board

3.4 • Anti-glare device/ screen

Anti-glare device/ screen is basically green or off white in color can be use as alternative where arboriculture is not possible due to narrow width of median or maintenance of plant is problem.



Fig. 20: - Anti glare device and anti-glare screen

III. RESULT AND CONCLUSION



Fig. 21: - Result

The figures are showing that how reflecting article provide guide and confidence to road user to drive fearlessly and safely without any unwanted collision.

Reflecting mean alone can give confidence to vehicle user to navigate his path without any further help. Basically, this reflector is put over sign board, obstruction, to direct the road, giving idea about intersection and turning and any hazard condition. Reflecting material are made up of different variety like thermoplastic; which is hot white or yellow resinous liquid substance with small glass beads as it provide glitter effect to reflect, reflective tape which are based on double reflection property of light emitted from head light of vehicle, hazard board etc. even at low light or no light condition this reflecting mean help alone to guide road user to reach his destination safely.

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