

# A Study of Future Technologies Road Pavement Markings for Modern Traffic Signalization

RINA

Deptt. of Civil Engineering  
H.No. 597/21, Tilak Nagar, Rohtak (HR)

**ABSTRACT:** *One of the main tasks of the driver is to follow the road. During the day, when the visibility on the roads under good weather is undisturbed, it is not difficult. However, at night on unlighted roads is not simply to identify flow of traffic. Therefore, the drivers often complain on insufficient signaling in the terms of night driving. Quality solutions to specific local traffic problems can have a significant impact on the quality of the entire flow of the network traffic, increased security in closer and wider area and motivated participants in the traffic on collaboration. In the near future, the road (road markings) will "glow" in the dark without being illuminated by headlights of the vehicle; detect the presence of ice on the roads thanks to a new type of material for road markings, modern technologies and new materials for the road. In the long term, smart roads will charge electric cars and their connection with GPS devices will provide continuous monitoring of traffic.*

**Keywords:** Traffic Signalization, Retro Reflection, Modern Concept.

## INTRODUCTION:

Practice and science confirms, as with us, and in the world, the quality traffic signalization with high reliability can be achieved with little funds thanks to modern technology of traffic signalization. It has been scientifically proven that proper use of traffic signalization and the use of quality materials for traffic signalization can significantly reduce the number of traffic accidents. By reducing traffic accidents, costs of society are reduced that arise due to death and injuries participants in the traffic, treatment costs, court costs, etc. Reducing these costs produces a surplus of material and financial resources, which can then be used in a more useful purpose. Besides, harmonization of standards relating to the traffic signalization with the laws and regulations adopted in Western countries is a prerequisite to a faster and simpler Croatian integration into the economic and economic developments. While driving, the driver received more than 90% of the information through sight and at night and in low visibility quantity of the information decreases to a minimum. Modern traffic signalization represent a visual guideline of traffic situation and the implementation of new technologies and materials in the performance of traffic signalization and thus affect the behavior of all of the participants in a way that helps drivers to follow a chosen path and adjusting the speed to technical elements of the road. Drivers need efficient signaling, effective road markings that allow to view the road ahead in a time of 5s, what corresponding to 140m at a speed of 100km/hour. During the

day it is possible to control on higher and shorter distances. Managing at larger distances is carried out with the central observation in certain intervals, while managing over shorter distances generally done automatically, continuously and with peripheral perception. But in terms of night driving drivers are often forced to use only visual control over short distances and a central observation, deliberately, repeatedly and with considerable mental effort. Good pavement marking increases traffic safety. The presence and type of road marking affect the speed and the position that driver will choose. However, the results regarding the changes in speed are not always harmonized. While some studies suggest a decline, most of them inform about slight increase in speed as a result of improved pavement marking. It is made a small number of controlled subjective and objective measurements of visibility. The results show that the distance of visibility during night driving generally is much smaller than the selected security criteria. Harsh tests are on wet pavement.

### **VARIOUS STUDIES OF PAVEMENT MARKING:**

- In the United States, the first documented use of a painted center line was in 1911 along Trenton's River Road in Wayne County, Michigan. According to the state of Michigan, the idea of using a painted center line was conceived in 1911 by Edward N. Hines, the chairman of the Wayne County, Michigan, Board of Roads, after watching a leaky milk wagon leave a white trail along a road. Hines was inducted posthumously in 1972 into the Michigan Transportation Hall of Honor for his innovation, and was honored in 2011 with the first Paul Mijksenaar Design for Function Award.
- In 1917, the idea of using painted center lines on rural state highways was conceived and/or put into action in at least three states (Michigan, Oregon, and California), apparently completely independent of one another. At some point in 1917, a white highway center line was painted along "Dead Man's Curve" on what is now County Road 492 in Marquette County, Michigan, under the direction of Kenneth Ingalls Sawyer, who served as engineer-superintendent of the Marquette County Road Commission. Sawyer was inducted posthumously into the Michigan Transportation Hall of Honor in 1973.
- In Oregon in April 1917, a yellow center line was painted down the center of the Columbia River Highway, between Crown Point and Multnomah Falls, at the direction of Multnomah County Sheriff's Deputy Peter Rexford. Later in 1917, the same line was continued west of Crown Point. Rexford first conceived the idea of a yellow center line in early 1917 while riding on a bus from Salem, Oregon on a dark and rainy night, and advocated it as a safety measure on the Columbia River Highway, which Rexford patrolled as a traffic officer.

The question of which color to use for highway center lines in the United States enjoyed considerable debate and changing standards over a period of several decades. By November 1954, 47 states had adopted white as their standard color for highway centerlines, with Oregon being the last holdout to use yellow. In 1958, the U.S. Bureau of Public Roads adopted white as the standard color for the new interstate highway system. The 1971 edition of the Manual on Uniform Traffic Control Devices, however, mandated yellow as

the standard color of center lines nationwide. The changeover to the 1971 MUTCD standards took place between 1971 and 1975, with most done by the end of 1973, so for two years drivers still had to use the old and new. Yellow was adopted because it was already the standard color of warning signs, and because it was easy to teach drivers to associate yellow lines with dividing opposing traffic and white lines with dividing traffic in the same direction. Road markings can be defined as a set of longitudinal and transversal lines, signs and symbols, which combination formed surface of traffic infrastructure. They represent a part of the entire traffic signalization and cannot be replaced by other signs or regulations. Today there are several types of materials for road markings, which differ in the method of application, longevity, cost, and structural features. Materials for road markings may not increase the slipperiness of pavement, and for this purpose, are added elements that increase the surface roughness of the pavement. Currently markings on the pavement are made in the following ways as:

- Painted Marks
- Marks of Plastic Materials (Cold Plastics, Thermoplastics)
- Ready Marks (Strip)
- Raised Marks
- Illuminated Raised Marks

Each of these ways of preparation marks and material has its own characteristics and advantages and disadvantages in the application.

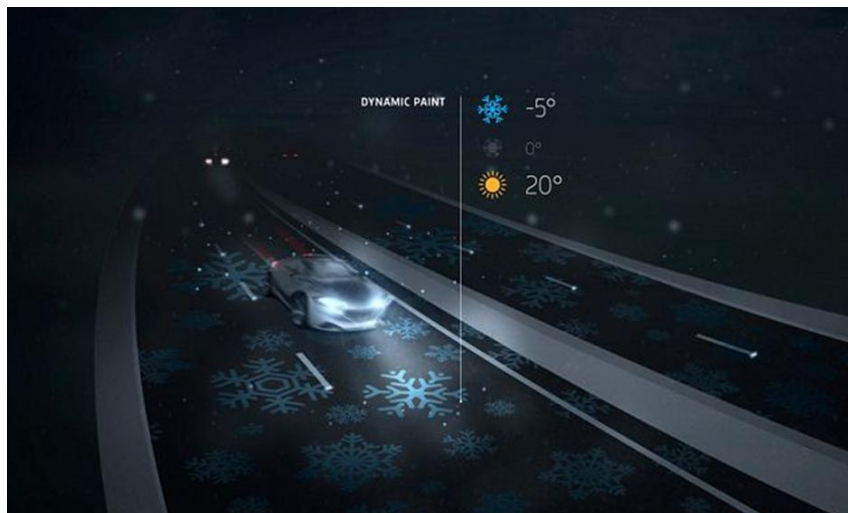
### ROAD MARKINGS:

In the mid 2013 first "smart" highway on which will contain special asphalt, which will not only light up in the dark, but drivers will be able to get direct from him information about road conditions. Smart highway was designed by a team from the company Studio Roosegaarde, while the infrastructure provided Heijmans group. The Smart Highway by Studio Roosegaarde and infrastructure management group Heijmans won Best Future Concept at the Dutch Design Awards, and has already gone beyond pure concept. The studio has developed a photo luminising powder that will replace road markings. It charges up in sunlight, giving it up to 10 hours of glow in the dark time come nightfall.



(Smartroad "Lights up in the Dark")

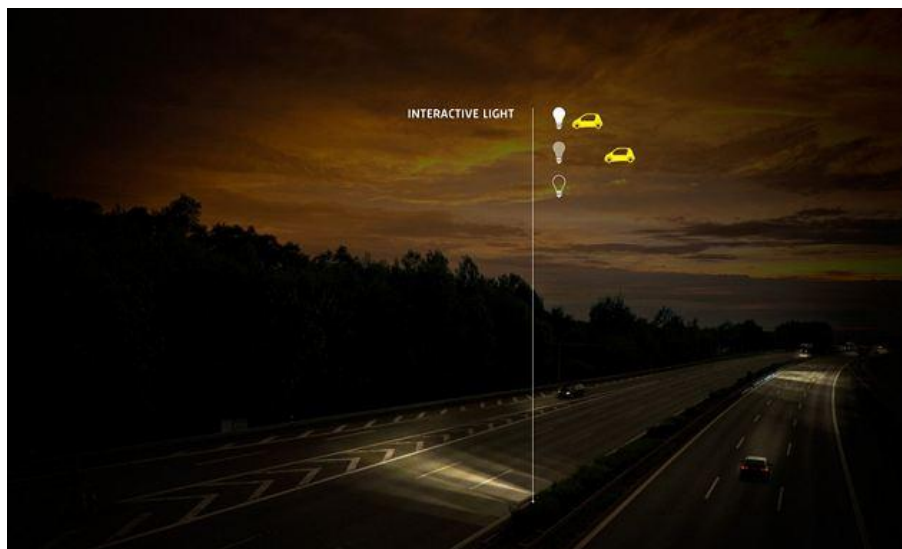
Special paint will also be used to paint markers like snowflakes across the road's surface. When temperatures fall to a certain point, these images will become visible, indicating that the surface will likely be slippery. Roosegaarde says this technology has been around for years, on things like baby food. In this way, drivers will be warned in real time that the road they are driving is slippery and should adapt driving to the current conditions.



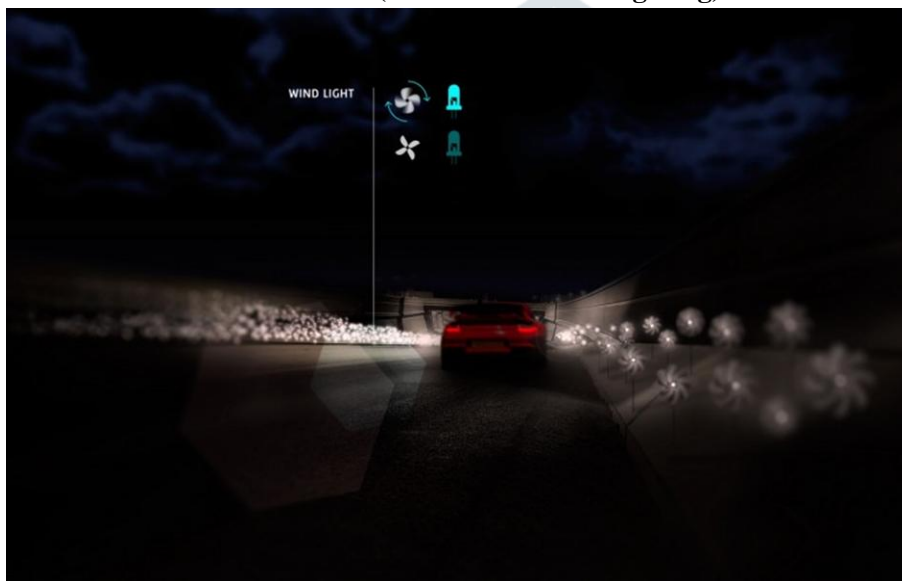
**(Warnings of a possible ice thanks to a specialcolor)**

The first few hundred meters of glow in the dark, weather indicating road will be installed in the province, followed by priority induction lanes for electric vehicles, interactive lights that switch on as cars pass and wind powered lights within the next five years. The idea is to not only use more sustainable methods of illuminating major roads, thus making them safer and more efficient, but to rethink the design of highways at the same time as we continue to rethink vehicle design. As Studio sees it, connected cars and internal navigation systems linked up to the traffic news represent just one half of our future road management systems roads need to fill their end of the bargain and become intelligent, useful drivers of information too. In the next few years, the road will get a special interactive light (completely off the lights on the major roads of the Highways Agency only in 2011. saved approximately 400 thousand pounds) which will light only if cars pass them and will be supplied with a combination of solar energy and wind power, including wind created by speeding cars.





(Interactive Road Lighting)



(Power of the wind created by speeding cars for road lighting)

The basic idea is to create a smart highway completely self sustaining system of road lighting and ultimately create a safer and more efficient transport infrastructure (73% of local governments stop or reduce the volume of traffic signs in periods of reduced traffic intensity). Roosegaarde from studies particularly emphasize that one of the objectives of this paper make responsible to think about the design and improvement of not only the means of transport but also a road on which vehicles will be move in the future. Networked cars with internal navigation systems which in real time receive relevant information about the condition of the roads are only one part of successful management of future transportation systems. Besides the vehicles, roads also must become more intelligent. Only combination of smart cars and smart roads can be created a safe and efficient transportation infrastructure that will future drivers do more enjoyable experience.

**CONCLUSION:**

Traffic signalization is a visual guideline of traffic situation and affects the behavior of all the participants, and also provides unambiguous and clear information to all road users, especially drivers in pursuit of the chosen path and adjusting the speed technical elements of the road. Drivers in driving should detect, recognize and understand traffic signalization, and for that greatest impact has her visibility especially at night and in low visibility. Many accidents occur or can be correlated precisely with weaker visibility of road markings. When drivers due to weaker conditions visibility cannot see road markings, often lose their orientation to their current position on the road causing the cross section of the road that is designed for the vehicles from the opposite direction or landing from the road because they are not able to detect in time where the edge of the pavement is. Information to the driver is usually related to objects that transmit a message. By day, in conditions of good visibility experienced drivers outline an area of several hundred meters ahead of the vehicle, almost to the level of visibility, as though unconsciously trying to reduce the possibility of unexpected events. At night, there are different rules. There are no visible spots in the distance on which we can focus so at night the focus is closer to the vehicle and the right side of the car. Research and innovation in the field of materials for making marks on roads is continuous and what is trying to achieve is greater visibility of the marks for driver during difficult driving conditions. Also research and innovation in the field of smart transportation construction persist continuously for more than 30 years. However, what is lacking is the implementation of these innovations, and ensures that these innovations become intuitive, easy to use and therefore extremely valuable to the end user the driver. To make this really happened; a mentality change needs to take place within a country and its people.

**REFERENCES:**

1. Scukanec A.: Application of retro reflective materials as a function of road traffic safety, Doctoral Dissertation, Faculty of Traffic and Transport Science, Zagreb, 2003.
2. Pasagic, S., Dadic, I., Mlinaric, T., Pavlin, S., Scukanec, A.: Visual information in traffic, Faculty of Traffic and Transport Science, Zagreb, 2000.
3. Guidelines and technical requirements for the works on renewing road markings, Croatian Roads Ltd., Zagreb, 2010.
4. <http://www.studioroosegaard.net/project/smart-highway> March 2013.
5. <http://www.smartplanet.com/blog/bulletin/heres-the-smart-road-of-the-future>.
6. <http://www.smartplanet.com/blog/bulletin/smart-paint-lights-your-way-on-the-highway>.