

SPEED LIMIT AND ENVIRONMENTAL IMPACT: THE IMPACT OF TRAFFIC FLOWS ON THE ENVIRONMENT

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Annotation: *Road transport and roads have a significant impact on the development of society. However, this connection has a negative side. The functioning of the road transport system is associated with environmental pollution, especially in conditions of urbanization; significant consumption of energy produced in the world; significant consumption of oxygen from the biosphere. Road transport plays a crucial role in ensuring the vital activity of the population. However, it also holds the first place in the negative impact on the environment, especially in cities and towns.*

Keywords: *nitrogen distribution, harmful substances, toxic*

The geometry of the road can contribute to an increase in environmental pollution. On descents, ascents, at road intersections, at stops where engine operating modes change, environmental pollution increases significantly. The quality of the road surface, depending on the grains of the micro profile, affects the noise level - with increasing grain sizes, noise increases. With the increase in road surface irregularities, deepening of joints, potholes, noise levels and emissions increase.

The main harmful substances in the exhaust are:

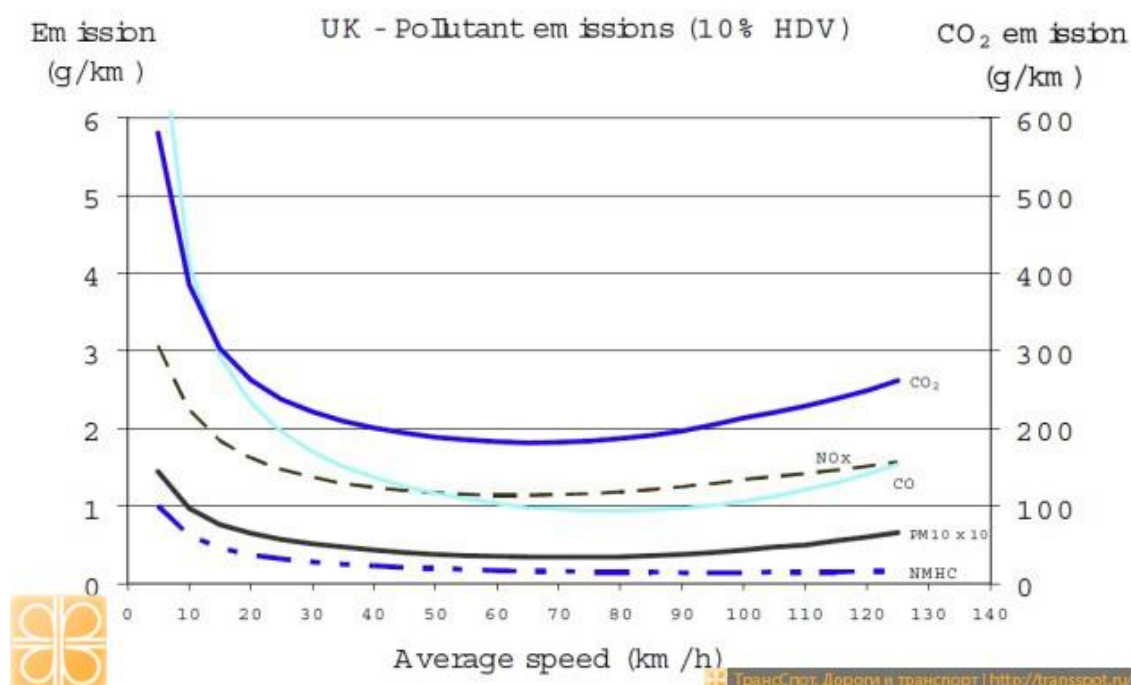
— Carbon monoxide or carbon monoxide (CO). Impairs the delivery of oxygen to the body. It is especially dangerous for people suffering from heart and respiratory diseases. Symptoms of poisoning include visual impairment, headache, and decreased performance.

— Hydrocarbon (HC). It has a toxic effect on the body, causing cancer and other diseases.



— Nitrogen oxides (NO_x). They are crucial in influencing health. During precipitation in the area of nitrogen distribution, water interacts with nitrogen and sulfuric and nitric acid are obtained, which form the so-called "acid rains".

— Solid particles. They settle in the lungs, and are the cause of asthma, chronic bronchitis, and impaired respiratory function. Solid particles that enter the air with the exhaust gases of diesel engines are highly toxic and can cause lung cancer. The exhaust of harmful substances varies greatly from the speed and technology of the engine system. The graph shows the dependence of the amount of harmful substances released depending on the speed of the car.

Nitrogen oxides are produced mainly at high operating temperatures of the motors, which corresponds to a constant high speed. Reducing the speed of driving seriously reduces the emission of this substance. The release of hydrocarbon decreases with decreasing speed. The lowest level of carbon monoxide and particulate emissions corresponds to the average speed of movement. Carbon dioxide is produced in proportion to fuel consumption. Each type of harmful substance has its own optimum speed. In modern cars, emissions are reduced for speeds of 40-90 km/h. It should also be noted that at a constant low speed (15 km/h or less), the emission of CO and CO₂ in terms of g/km is the largest. Driving style is the most important factor affecting emissions of harmful substances. With a sharp acceleration, fuel consumption increases and, as a result, exhaust emissions increase. Cold start also increases exhaust emissions, as the engine and catalytic filter have not reached operating temperature.



The dynamic speed limit implies changes in the set limits depending on the driving conditions. In this regard, DSL is often defined as an integral part of an Intelligent Transport System (ITS), which causes changes in speed limits depending on current information regarding the road, traffic conditions, meteorological conditions and/or environmental conditions. In practice, the system consists of variable information signs (dynamic message signs – DMS) installed along the road and connected via a communication system with the traffic management center. After processing the data and calculating the speed limits, the updated information is displayed on the DMS. The speed limits imposed are usually forced, although systems with recommended speed limits are known.

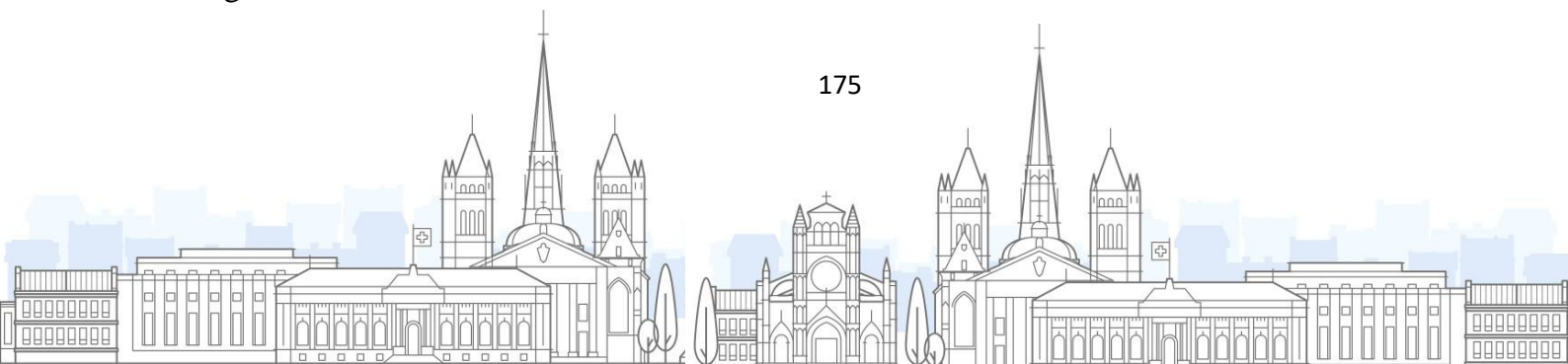


The choice of the optimal traffic mode is made taking into account the assessment of traffic conditions, including geometric parameters, transport and operational characteristics of roads, the condition of engineering equipment, traffic flow parameters and meteorological conditions. Conceptually, two methods of setting speed limits differ. The first is to set speed limits based on statistical observations of traffic flow speeds and set limits at 85% security. The second, analytical method consists in determining the permissible speed of movement, based on theoretical models of the interaction of the car with the road and its movement in the traffic flow. The analytical method is more versatile and allows you to take into account a variety of factors when setting restrictions, but requires careful selection of the traffic flow model.

The presented method allows you to set speed limits for vehicles on the highway, taking into account the influence of meteorological factors and the current state of traffic flow. It should be noted that the imposition of speed restrictions significantly reduces the capacity of the motorway. This requires measures to be taken both to step-by-step speed limits on the approach to an area with unfavorable traffic conditions, and to limit the number of vehicles entering the motorway in order to avoid congestion.

It is also important to understand that reducing the permissible speed does not lead to traffic jams in cities. There is a myth that everyone will drive very slowly. There are modern digital systems that eliminate the human factor and allow you to optimize traffic at any permitted speed, and often slow-moving vehicles get to where they need to go faster.

It is necessary to work with the population in a different way. Look, any serious injury on the road, injury, is a huge expense for the family, for the person who was in an accident. The accident leads to the fact that the family may be below the poverty line. Every member of society should realize that there is a simple measure to reduce the allowed speed in the city, which solves a bunch of problems at once: the poorer the country, the country of our post-Soviet space, the more difficult it is for families in this country to cope with out-of-pocket expenses for treatment, the faster it is necessary to implement this restriction. Of course, other factors are important: good lighting, good roads, good cars, but it costs a lot of money. The introduction of a speed limit does not cost that much money. Yes, it requires changing people's behavior, it is necessary to invest in information campaigns, in notifying the population, but it is necessary to explain not only "guys, let's slow down, save lives", it is necessary to give an example of a specific family that could avoid these costs and would have the opportunity to develop. I always define the problem of road safety for myself as the problem of preserving future generations.



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