

Increasing the turning radius allows drivers to take turns at higher speeds. This is particularly dangerous due to the driver's limited visibility. This point is partly related to the previous two - wide lanes without curb extensions at intersections lead to longer crossings, which reduces comfort for pedestrians. Large distances between intersections encourage drivers to accelerate [3].

Streets without enough pedestrian crossings force people to choose between making a long detour to the nearest marked crossing or crossing outside of the designated crossing. The latter situation often occurs when two points of attraction are located across from each other, but for some reason are not connected by a marked crossing. Streets that are designed for the safety of all road users are called "streets for everyone." Here are their main features (again, the numbers correspond to the image above): -In addition to the importance of reducing speed limits, the street design itself should promote slowing down of vehicles. -In narrow lanes, there is no problem - this is a natural way to reduce the speed of vehicles. -Well-marked crossings (with traffic lights, if necessary) signal to drivers: "there are pedestrians crossing here!", and sidewalk protrusions shorten the crossing distance. -Reducing the distance between crossings slows down vehicles.

-Traffic lights in the middle of long blocks increase connectivity of pedestrian routes, adding crossing opportunities (and also slowing down vehicles).

-Reducing turning radius forces drivers to further reduce speed, shortens the crossing distance, and overall makes intersections safer. If we start implementing solutions from the second list, the streets of our cities will become safer, and the number of people killed and injured in accidents will decrease much faster.

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HISTORY OF THE TRAM. APPEARANCE AND DEVELOPMENT

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A tram is a rail-based surface type of public route urban transport, mainly street, designed to move people within the city and urban agglomerations.

Trams appeared in the first half of the 19th century, electric ones - at the end of the 19th century. After the heyday between the world wars, trams declined, but since the end of the 20th century, there has been a significant increase in the popularity of trams in Western countries.

The electrified tram system was invented by the Ukrainian inventor Fedir Pirotskyi. He proposed and later implemented, together with Carl Heinrich von Siemens, a system consisting of a car or a train consisting of several cars of this type of transport, where one or more of the cars housed engines powered by overhead catenary. Most trams use electric current supplied through an overhead catenary network using current collectors. There are also third rail powered trams and battery powered trams. In addition to electric ones, there are also horse-drawn (horse-drawn), cable (Funicular) and diesel trams. There used to be pneumatic, steam, and gasoline-powered trams, as well as mule- and zebra-drawn trams [1].

The world's first passenger tram was in Wales, Great Britain. The Railway Act was passed by the British Parliament in 1804. The first horse-drawn passenger tram was put into operation in 1807. The tram was driven by steam from 1877, and from 1929 - by electricity.

In 1860, Birkenhead on the Wirral Peninsula became the first town in Europe to operate a street tram. It was started by the American George Francis. The train made its way from Woodside Ferry to the main entrance to Birkenhead Park and was driven by a horse-drawn carriage. On 4 February 1901, Birkenhead Corporation, owned by the Birkenhead Corporation Tram Lines, began work on extending the line, first to New Ferry and later around the town. The route closed on July 17, 1937. The electric tram was created by the genius of the famous engineer and inventor Werner von Siemens. In 1881, his firm Siemens & Halske opened the world's first tram connection between Berlin and Lichterfeld. In the same year, electric trains began to run through the streets of Paris.

The United States introduced its urban electric car independently of Europe. In 1885, the first American vehicle of this type was launched by the efforts of the inventor Leo Daft, and within a year, the corresponding connection was operating in Pittsburgh, New York and Cincinnati. In the same year, the tram system of another inventor, Charles van Depulet, began operating in Minneapolis. But it was finally improved by engineer Frank Sprague, who invented the world's first trolley rod.

At the beginning of the 20th century, the tram confidently mastered the largest cities around the world. In the conditions of recent expansion, rapid industrial and technological progress, the issue of public transport came to the fore - it was necessary to ensure the movement of a large number of people from their homes to their place of work. Against this background, in view of the still weak development of motor transport, the mentioned means of transportation had such competitive advantages as low cost of operation and high efficiency. In the 1920s, a network of tram tracks covered all major cities. But at the beginning of the 1930s, the ways of development of the aforementioned transport in Europe and North America, on the one hand, and the USSR, on the other, seriously diverged. In the first, it became obvious that he was beginning to lose the competitive struggle to other types, primarily buses and private cars. In addition, a competitor appeared on electric current - the trolleybus, the construction of the infrastructure for which was cheaper. As a result, already in the 1930s in Europe, the progress of the tram slowed down significantly, and after the Second World War, the city was rapidly flooded with private cars, so it slowly turned into an anachronism.

In 1971, French President Georges Pompidou said: "The city must accept the car." His words reflected the global trend of changes in the field of urban transport. During the 1960s and 1970s, streetcars completely disappeared from the streets of North America, France, Great Britain, India, Turkey, Australia, etc. A slightly different situation was observed in Germany, Austria and Belgium, where they were not only preserved, but also modernized. On the other hand, in their homeland, they were in no hurry to abandon their creation, and in this they were right.

At the end of the 1970s, in connection with the development of motor vehicles, the cities were already faced with other problems - their ecology and transport traffic significantly deteriorated. Smog, traffic jams, noise and lack of parking spaces have become commonplace. Due to high oil prices, municipalities had significant costs for fuel for buses. Life pushed the authorities to take care of more ecological public transport. The era of revival of trams has begun. In this case, the engineers had to first of all encourage car owners to switch to them, and for this it was necessary to radically change the attitude towards this type of transport as an anachronism. So, the designers of the new electric cars gave them a somewhat futuristic appearance. And the idea worked. In 1978, tram traffic was restored in Canada, later in the Netherlands, France and Great Britain. Where, for certain reasons, it was impossible to lay rails, experts offered an alternative - a tram on tires, that is, one that moves on wheels, but is guided by a single rail.

In the process of regeneration, another interesting nuance was discovered - most car owners categorically refuse to change to a bus or trolleybus, but they love to use rail transport. This largely contributed to the fact that the tram came out victorious in the competition with the trolleybus. In the USSR, such ups and downs remained unnoticed, since the aforementioned transport did not disappear from the streets of Soviet cities. On the contrary, in the Land of the Soviets, a certain modernization of it took place, an example of which can be considered the construction of a high-speed tram in Kyiv and Kryvyi Rih. Such contrasts with Europe and America were explained very simply: in the Soviet Union, a car was a luxury, and for a large part of the population, there was simply no alternative to ground public transport.

There are tram systems in 18 cities in Ukraine (Lviv, Odesa, Kharkiv, Kyiv, Dnipro, Mykolaiv, Zhytomyr, Vinnytsia, Yevpatoria, Donetsk, Yenakieve, Zaporizhzhia, Horlivka, Mariupol, Kryvyi Rih, Kamianske, Druzhkivka, Konotop).

On September 3, the "tram of the future" was presented in Vinnytsia, which the employees of the Vinnytsia Transport Company created on the basis of the KT-4SU wagon. The transport company changed the design of the car, equipped it with the

control system of the Czech company Cegeles. This equipment helps to save 40% of electricity.

The new tram car has an air conditioning system, LED lighting, comfortable seats and Wi-Fi. In addition, the tram car is equipped with 7 video cameras: four - in the cabin, two for external surveillance, instead of mirrors, one as a video recorder in the driver's cabin.

According to experts, the rolling stock of trams in Ukraine is seriously outdated: more than 90% of cars are older than 20 years, more than 50% need urgent replacement.

At "Ecopolis KhTZ" in Kharkiv, they are starting to develop a modern tram [2].

Kharkiv tram

The first horse-drawn tram in Kharkiv started running on September 24, 1882. The wagon, drawn by a pair of horses, traveled along the rails, which were strictly forbidden to cross. This transport belonged to the French Society, later the horse was transferred to the Belgian Society. According to experts, it was the popularity of horse-drawn carriages in Kharkiv that played an evil role in the appearance of the first electric models of this transport.

The first line of the Kharkiv electric tram opened on July 3, 1906. 12 MAN wagons were launched at once, and the first tram depot was built to service them. It was located in the same place where "Miskelektrotransservice" is now located. The length of the route of the first electric tram was 3.8 kilometers. After some time, trams began to be used to transport residents to more remote areas. The most popular route among the population was the tram moving along Pushkinskaya Street. The line opened in 1910. In 20 years, due to the inconvenience of moving along this line, the authorities even demolished the St. Nicholas Cathedral. From that time to the present, the role of trams in Kharkiv is difficult to overestimate, since even the metro does not solve all the transport problems of the metropolis. Therefore, any traffic jam on the tram tracks today causes chaos in the entire transport system.

The tram in the village of Molochna Autonomous Republic of Crimea is the smallest tram system in the world (the length of the route is 1.5 km).

Lviv became the first city on the territory of modern Ukraine in which a tram appeared. It happened in 1880. And today, Lviv remains the only city in Western Ukraine where this type of transport operates. Initially, it was horse-drawn, since 1894 it was replaced by electric traction. And in the 21st century, it remains one of the main modes of transport in the city of Leva.

The Kyiv tram became the first in Ukraine to receive electric traction. It was an event not only for Ukraine - it was also the first for the then Russian Empire, and in general it became the third in Central Europe according to this indicator after Budapest and Prague. It happened in 1892. It was the result of very pragmatic circumstances.

A year earlier, the first horse-drawn tram line was opened, but due to the hilly terrain of Kyiv, the horses could not withstand the load - it was very expensive to go up from Podil and back down, the second horse had to be changed often. The then owner of Kyiv trams, Amand Struve, issued a decision for his business, and already on June 18, 1892, the first electric transport was operational in the city.

The total length of tram routes in the city of Odesa is 313.5 kilometers. Today it is the longest system in the country. The first of these routes was opened back in 1882, which makes it one of the first in terms of age on the territory of modern Ukraine.

Another interesting feature is connected with Odessa - local tram drivers from Odessa are traditionally called whatmans [3].

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FREIGHT TRANSPORTATION IN UKRAINE 2022-2023

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After February 24, air and sea logistics in Ukraine simply ceased to exist as an industry. Two other types of transportation remained: road and rail. But there are problems with them as well.