

MODERN PASSENGER CARS - AN INDICATOR OF PASSENGER COMFORT

Abduraximov Xalilullo Abduvohid o'g'li

2nd year student of the Faculty of Railway Transport
Engineering



Annotation. *This article analyzes the development trends of modern passenger cars and the technological advances expected in the future. Automated control systems, artificial intelligence and new technologies are increasing the safety, efficiency and comfort of trains. The speed of trains, ergonomic design, personalized services and innovative safety systems are expected to become the main features of future passenger transport. Also, new technologies such as "Hyperloop" will increase the speed of trains, making movement more economical and safe. In the future, trains will not only be economical and efficient, but also allow passengers to travel as comfortably and safely as possible.*

Keywords: *Passenger cars, automated control systems, artificial intelligence, speed, hyperloop, ergonomic design, personalized services, security systems, innovative technologies, transport system.*

Introduction. Railway transport is one of the most reliable and convenient means of passenger transportation in modern society. In recent years, as a result of the modernization of passenger cars, the level of comfort and safety has significantly increased. As part of measures aimed at increasing the level of comfort for passengers, ergonomic design, security systems, climate control, infotainment services and other modern technologies are being introduced.

Ergonomic design and interior Ergonomic design - adapted to the natural position and movements of the human body, increasing comfort in modern passenger cars. The seats are orthopedic, their height, backrest and footrest can be adjusted. On long-distance trains, there is also the possibility of lying down.

The lighting system in the interior is adapted to the natural routine: during the day, natural light enters through large windows, and at night, soft lighting is used. The colors are calm, neutral, reducing fatigue. Special materials and shock absorbers are installed to reduce noise and vibration, and the windows have sound insulation.

Air quality is also important, climate control systems and an air filtration system provide an optimal environment. Some trains also have the ability to adjust the temperature. The windows are equipped with a coating that filters ultraviolet rays.

There are special places for passengers with disabilities, lifting platforms and instructions in Braille.

Security systems Safety is one of the top priorities in modern passenger cars. Automated systems have been introduced to ensure safety. These include temperature control, fire alarm, automatic braking and video surveillance systems.

Heat and smoke detectors are installed for fire safety, and fire extinguishing systems quickly extinguish fires in emergency situations. All cars are made of fire-resistant materials. The presence of seat belts at each seat, and special airbags on high-speed trains, protect passengers.

Video surveillance systems constantly monitor passengers, detect suspicious movements and notify security officers. There are safety exit doors and automatic evacuation systems that facilitate evacuation in an emergency. Automatic braking systems monitor the movement of the train and, if necessary, automatically brake.

Medical sensors on some trains monitor the health of passengers and call an ambulance in case of an emergency. Information systems provide passengers with information about safety rules and emergency situations.

Modern safety systems are aimed at protecting the lives and health of passengers and are expected to be further improved in the future.

Speed and energy efficiency Modern passenger cars are distinguished by their speed and energy efficiency as a result of technological progress. High-speed trains are reaching speeds of up to 400 km/h, creating competition for traditional vehicles. For example, high-speed trains are actively used in Japan, Germany and France.

To increase speed, the cars have aerodynamic features. The nose parts are designed in a smooth way, which reduces wind resistance. Noise is reduced and energy consumption is reduced. To increase energy efficiency, regenerative braking technology is used, which helps to reuse the energy generated during braking. Lightweight, strong materials, such as aluminum and carbon fiber composites, reduce the weight of the train and reduce energy consumption. Some trains are equipped with solar panels and generate their own energy. Intelligent control systems prevent excessive energy consumption.

In the future, trains based on magnetic levitation technology will help to increase speed and reduce energy consumption. In Japan and China, such trains are running at speeds of up to 600 km/h.

Personal services and convenience Modern passenger cars are equipped with advanced technologies, maximizing passenger comfort. Ergonomic seats, modern lighting systems and individual compartments reduce fatigue on long journeys. The orthopedic shape of the seats, adjustable backrests and footrests allow passengers to comfortably sit. Some trains also have a massage function. Each passenger has the ability to adjust the temperature, lighting and air flow without leaving their seat. Some trains also have individual cabins with separate heating and cooling systems.

Infotainment systems provide passengers with multimedia services, Wi-Fi and the ability to read e-books. Food and beverage ordering services are also available, and some premium trains even offer personal waiter services.

Attention has been paid to hygiene and sanitation issues, with automatic cleaning systems, antibacterial toilets and air filtration systems being introduced. Some trains also have private showers and toilets.

Modern carriages have multifunctional areas, such as lounges, libraries, business departments and conference rooms. Long-distance trains have cabins equipped with special office equipment for business people.

In this way, modern trains allow passengers to travel not only quickly and safely, but also comfortably and pleasantly.

World and Uzbekistan experience Modern passenger cars are developing around the world, modernizing countries' transport systems and creating a comfortable and safe travel experience for passengers. Countries such as Japan, Germany, France, and China are leading the way with high-speed trains. Japan's Shinkansen trains have a speed of 600 km/h and meet high safety standards. China's Fuxing series trains run at a speed of 350 km/h and are highly energy efficient. In Europe, Germany's ICE and France's TGV trains are leaders in speed and comfort. These trains are distinguished by their aerodynamic design, regenerative braking system, and high-level service. In the United States, work is underway on the California High-Speed Rail project, but the high-speed rail system has not yet been developed.

Uzbekistan is also modernizing its railway transport. The Afrosiab high-speed electric trains run at a speed of 250 km/h and provide convenient travel between cities. Uzbekistan is modernizing its railway system, introducing new electric locomotives, modern wagons and digital services. Projects are also being implemented to develop high-speed railway infrastructure in Central Asia.

In the future, Uzbekistan plans to introduce hydrogen-powered trains, autonomous wagons and artificial intelligence-based security systems. The goal is also to expand the region's transport and logistics capabilities by integrating the railway network into international systems.

Future trends In the future, passenger cars are expected to be further improved based on automated control systems and artificial intelligence. The development of science and technology is planning to make trains more efficient, safe and more human-friendly.

Artificial intelligence will optimize the schedule in real time, monitor the technical condition of the train and detect emergencies in advance. Smart sensors will automatically control the temperature, humidity and air quality inside the car. Passengers will also have the opportunity to choose personalized services, such as seat adjustments, massage functions and services through virtual assistants. Speed will also be an important factor in the future, and technologies such as "Hyperloop" can increase the speed of trains to 1000 km / h. Such systems will make movement more economical and safe. The design will provide ergonomic seats and interactive services, and virtual reality technologies will create additional comfort during the trip.

Safety systems will be updated based on new technologies, smart systems will detect emergencies in advance, and autonomous trains will control the flow of traffic in real time.

All this will help make future trains not only more comfortable, but also more efficient. Scientific and technological advances will make passenger transport more convenient and economical.

Literatures:

1. Ministry of Transport of the Republic of Uzbekistan. Activities and Development Prospects of "Uzbekistan Railways" JSC. – Tashkent, 2024.
2. International Union of Railways (UIC). "High-Speed Rail Development: Global Trends and Future Perspectives". – Paris, 2023.
3. European Railway Agency. "Safety and Innovations in Passenger Trains". – Brussels, 2023.

4. Japan Railway Group. “Shinkansen: The Future of High-Speed Rail”. – Tokyo, 2023.