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RESEARCH OF DEVELOPMENT TRENDS OF HIGH-SPEED TRAFFIC IN THE REPUBLIC OF KAZAKHSTAN

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RESEARCH OF DEVELOPMENT TRENDS OF HIGH-SPEED TRAFFIC IN THE REPUBLIC OF KAZAKHSTAN

Abstract: The start of work on the high-speed highway has become a real technological challenge. Since we are talking about a new high-tech railway facility, there is a need for fundamentally new engineering and technical solutions, innovative approaches to conducting surveys, designing, building and operating new rolling stock and infrastructure.

High accuracy in the design, construction and maintenance of the railway track is of key importance in the creation of a high-speed highway. A thorough analysis of the experience of the world's leading organizations in China, Japan and European countries, specializing in the creation and operation of high-speed highways, shows that the most effective system-technical solution is the transition to the use of high-precision coordinate methods of design, construction and maintenance management of infrastructure and rolling stock.

It is precisely the high-precision coordinate methods that open the way to the transition to the operation of the infrastructure in the design position. And this, according to the world's leading experts, is an opportunity to reduce the cost of the current maintenance of such an expensive infrastructure by 20-30%.

The technical solution that ensures the use of coordinate methods in the" end-to-end " technological life cycle of infrastructure objects is the creation of a high-precision coordinate system along the directions of the high-speed highway.

Keywords: high-speed rail-highway, carriers, 30 developed countries, economy, transcontinental transit, network

Introduction. A high-speed line is a specialized railway line designed for trains with high speeds from 200 to 400 km / h. Under high-speed traffic - transportation of passengers at a speed of 140 to 200 km / h along modernized lines. The first public high-speed railroad was built in Japan. The Japanese Railways Administration created a

high-speed rail project between the high-traffic cities of Tokyo and Osaka in 1956-1958. The Japanese found that with the installation of a special track and more powerful engines, the train can reach speeds of up to 270 km / h. So on the Tokyo-Osaka line, the travel time was reduced from 6 hours 40 minutes to 2 hours 25 minutes. Today, these lines carry about 125 million passengers a year. By the end of the 20th century, the experience of Japan was adopted by: Italy, Spain, France, Germany and Belgium. By the beginning of the XXI century, the speed of trains had already increased to 380 km / h.

In Europe, the first high-speed rail networks were created in France in 1981, and since the early 1990s - in Germany, Italy, Spain, Sweden, and Great Britain. In 1994, Eurotunnel high-speed trains opened under the English Channel. After its construction, a high-speed train Eurostar began to run between Paris and London under the strait. The construction of tunnels allows you to cross the sea straits without ferry communication. In 1985, after the start of the French network of high-speed electric trains TGV, the Transport Commission of the European Union (hereinafter - EU) put forward a number of important proposals for organizing high-speed traffic in Europe.

Initially, the proposals to combine the HSR into a single network concerned only highways created by the national French railway operator SNCF, but soon international projects were also created. Since 2002, high-speed and high-speed railway lines of Western European countries have been integrated into the pan-European railway network with a length of about 15 thousand km. In 2008, with the help of Siemens, the HSR was built in China. High-speed train traffic made it possible to switch the main passenger traffic from airplanes to railways. If in 2008 almost all high-speed trains were purchased from Japan, Germany and France, then by 2011 China had already established its own production based on these samples. Now Chinese factories produce their own trains every year, some of which are exported.

According to the plans of the PRC, by 2020 the length of high-speed railway lines in China will reach 30 thousand kilometers, covering all cities with a population of 500 thousand people.

The extension of the broad gauge 1520 from the city of Kosice (Slovakia) to Vienna (Austria) will connect Asia with Europe via the Trans-Siberian Railway. The Trans-Siberian Railway connects the European part, the Urals, Siberia and the Far East of Russia, the Russian western, northern and southern ports, as well as railway exits to Europe, on the one hand, with Pacific ports and railway exits to Asia.

The launch of the Moscow-Vienna high-speed railway will allow the transportation of goods and passengers from China to Europe within three days. The existing infrastructure makes it possible to provide cargo delivery from the eastern to the western borders of Russia in at least seven days. The traditional delivery time is 9-10 days. The transfer of transit cargo to rail transport is one of the priorities of the EU, as evidenced by the constant reloading at the Malaszewicz station located on the border of Poland and Belarus. In 2017, the volume of international cargo transportation in the Russia-Austria route amounted to 523.3 thousand tons, an increase of 3 times compared to 2016.

The railway track in Russia is 1520 mm wide, and the European railway track is 1435 mm wide. It is planned that the broad-gauge railway to Europe will go to Bratislava with access to Vienna and the creation of an international logistics center on the Danube. The extension of the 1520 gauge to the center of Europe is objectively necessary in conditions of competition with the sea mode of transport. According to the calculations of the Austrian Ministry of Transport, the project will cost 6.5 billion euros. Construction work is scheduled to begin in 2023 with completion by 2033. Operational and information systems are to be improved to speed up customs clearance. The project to create a new Eurasian transport corridor is being implemented jointly by the railways of Austria, Slovakia and Ukraine. The work is carried out within the framework of the joint

venture "Breitspur Planungsgesellschaft", registered in Austria in 2009.

The BVO consortium of companies Bernard (Austria) - Walbeck (Slovakia) - Obermeier (Germany), selected on the basis of open tender procedures, completed work on a full feasibility study of the project. As part of the feasibility study, the analysis of cargo flows was clarified, the Deloitte company developed a business plan and a business model of the project. HSR "Eurasia" is the largest international project, part of the "One Belt - One Road" initiative, which involves the integration of high-speed rail networks in Europe and China. Its implementation will increase the competitiveness of railway transport, create significant socio-economic and agglomeration effects.

The total length of the Beijing - Moscow - Berlin highway will be 9,447 km, covering the territory of six countries: China, Russia, Kazakhstan, Belarus, Poland and Germany. The basic routing of the line across the territory of Russia and Kazakhstan has already been agreed. The length of the highway through the territory of Russia is 2,366 thousand km along the route "Krasnoe (border with Belarus) - Moscow - Kazan - Yekaterinburg - Chelyabinsk - Zolotaya Sopka (border with Kazakhstan)". The Russian section can be covered in 9.5 hours, the Brest - Dostyk section in 19.5 hours at an average speed of 250 km / h. The cost of the Russian section of the Eurasia HSR is estimated at 3.58 trillion. rubles. The total capital expenditures for the construction of the Brest - Dostyk section amount to 7.08 trillion. rubles, the section "Dostyk - Urumqi" - 0.76 trillion. rubles.

Due to the lack of world analogues, high-speed freight rolling stock is designed on the basis of a passenger one. The basic structure is 12 cars, the maximum speed will reach 350 km / h. The estimated cost of one freight and passenger train is estimated at 2.7 billion rubles. Forecasts of freight and passenger traffic along the Eurasia corridor are based on the work carried out by PricewaterhouseCoopers and the Center for Infrastructure Economics. Passenger traffic on the Eurasia HSR by 2050 is estimated at 36.9 million passengers per year. According to preliminary calculations, the planned revenue of the Eurasia HSR in 2050 should amount to 2.77 trillion. rubles, while the largest part of the income will come from freight transportation. By that time, the highway should carry 11.9 million tons of cargo per year. With a total trade turnover in the EU-China direction of 144 million tons per year, the construction of the Eurasia highway will not radically affect the global supply chains. The Russian strategy for the development of high-speed rail links includes the Moscow - Kazan route, with an extension to Yekaterinburg, and then through Kazakhstan to Beijing, within the framework of the New Silk Road project. The Moscow - Kazan section is the first stage of the large high-speed line Eurasia. The site is currently being designed by a Russian-Chinese consortium. The commissioning of the Moscow-Kazan high-speed railway is scheduled for 2023. The line of the first high-speed rail will pass through the territory of 7 constituent entities of the Russian Federation: Moscow and the Moscow region, the Vladimir and Nizhny Novgorod regions, the Chuvash Republic, the Republic of Mari El and the Republic of Tatarstan. The high-speed rail will connect the capitals of the regions with a single 790 km long route. with stops in 16 settlements of different sizes. The operational speed of the trains will be up to 360 km / h, with transportation within 3.5 hours.

China intends to invest more than 600 billion rubles in the project, subject to the use of Chinese technologies. The launch of the high-speed rail will lead to an increase in the level of consumption of services and goods, new jobs will be created to meet demand, and housing construction will increase. More than 370 thousand jobs will be created at the construction stage in various sectors of the economy. Only in the manufacturing industry it is planned to create 155.2 thousand jobs. Due to the multiplier effects after the construction of the Moscow - Kazan HSR, the aggregate increase in the domestic regional product (hereinafter GRP) for the first 10 years of HSR operation will amount to 9.3 trillion rubles. A special place in the project of

the highway is occupied by the ballastless structure of the superstructure of the track, which is the main design solution. The high-speed rail project carries out a qualitative transition in the creation of a railway track from the classical technology using crushed stone and sleepers to a monolithic concrete structure. Almost a third of the Moscow-Kazan high-speed rail route will run over bridges and overpasses. To ensure high-speed traffic and not impede the movement of vehicles, the designers needed to get rid of intersections with the existing road transport network. The high-speed rail does not cross at the same level with other transport lines and solves the problem of long waiting times at railway crossings. The project uses unified structures of artificial structures (split beam systems and continuous reinforced concrete beam systems) and the structure of the subgrade. The traffic safety system is maximally automated, excludes the influence of the "human factor". The construction of the first Russian high-speed railroad is carried out by Russian enterprises.

The start of work on the high-speed line has become a real technological challenge. Since we are talking about a new high-tech railway facility, there is a need for fundamentally new engineering solutions, innovative approaches to research, design, construction and operation of new rolling stock and infrastructure. High precision in the design, construction and maintenance of a railway track is of key importance in the creation of a high-speed line. A thorough analysis of the experience of the world's leading organizations in China, Japan and European countries specializing in the creation and operation of a high-speed highway, carried out by specialists, indicates that the most effective system and technical solution is the transition to the use of high-precision coordinate methods of design, construction and maintenance of infrastructure and mobile composition. A technical solution that ensures the use of coordinate methods in the "end-to-end" technological life cycle of infrastructure facilities is the creation of a high-precision coordinate system along the directions of the high-speed highway.

Modern railway communication is unthinkable without high speeds as the basis for the innovative development of railways and an effective tool for solving important socio-economic problems on a national scale. The implementation of high-speed and high-speed traffic projects will make a significant contribution to eliminating bottlenecks in the transport system of Russia and will allow to remove a number of restrictions on economic growth by increasing budget revenues and gross regional product, developing domestic engineering, tourism and other related sectors of the economy.

The construction of a high-speed highway network and high-speed lines is provided for by the updated Transport Strategy of the Russian Federation for the period up to 2030 and is taken into account in the Forecast of the country's socio-economic development. All of these documents imply the strengthening of the investment orientation of economic growth, based on the creation of modern transport infrastructure and high-tech industries.

The issue of creating an integrated transport network using high-speed and high-speed railway communication has been conceptually worked out with government departments, regions and business.

Conclusion.

Today we can say with confidence that high-speed and high-speed traffic means ensuring the integration of territories at a new level, creating conditions for increasing the mobility of the population and increasing the efficiency of the use of labor resources, reducing the delivery time of goods, new opportunities for the growth of the country's economy, for the development of regions. Moreover, this is a fundamentally different quality of life for people, the successful implementation of the transit potential of Russia and close integration into the Eurasian transport space.

The implementation of high-speed and high-speed traffic is, first of all, large innovative projects in the field of creating transport infrastructure, rolling stock, the

formation of new technologies and transport ideologies. All this is possible only on the basis of the results of a spectrum of scientific research, which are of a breakthrough nature.

Obtaining new scientific achievements, modern knowledge and competencies is impossible without a deep analysis of world experience, fundamental, exploratory and applied research, the presence of a scientific infrastructure, whose activities are aimed at achieving competitive results.

REFERENCES

[1] Blatnov M.D. Passenger road transport. 1981

[2] Bogumil, V.N. Assessment of the main parameters of traffic flows on the city's road network based on the processing of navigation data of urban passenger transport. 2011

[3] Basel'tsev A.B., Baytulaev A.M., Efimenko D.B. Operational management of urban passenger transport in an automated navigation dispatch system. 2011

[4] Baytulaev A.M. Improvement of telematic systems for operational dispatch control of passenger transport in a megalopolis. 2010

[5] Afanasyev L.L., Ostrovsky N.B., Zuckerberg S.M. Unified transport system and road transport. 1984

[6] Blinkin A.Ya. Kharpov S.Kh. Quantifying the effect of increasing the regularity of urban bus routes. 1982.

[7] Blinkin M.Ya. Kirichenko V.A. Mikhailov A.A. Sarychev A.B. Assessment of the correspondence of the carriage capacity to the demand for transportation // Improving the organization and management of the transportation process in passenger road transport. 1986

[8] Bogumil V.N. How to solve the problem of ensuring the safe functioning of land passenger transport. 1999

[9] Bagdasarov A.M. Passenger motor transport and the organization of its work abroad. 1983

ЛИТЕРАТУРА

[1] Блатнов М.Д. Пассажирские автомобильные перевозки. 1981

[2] Богумил, В.Н. Оценка основных параметров транспортных потоков на улично-дорожной сети города на основе обработки навигационных данных городского пассажирского транспорта. 2011

[3] Базельцев А.В., Байтулаев А.М., Ефименко Д.Б. Оперативное управление городским пассажирским транспортом в автоматизированной навигационной диспетчерской системе. 2011

[4] Байтулаев А.М. Совершенствование телематических систем оперативного диспетчерского управления пассажирским транспортом в условиях мегаполиса. 2010

[5] Афанасьев Л.Л., Островский Н.Б., Цукерберг С.М. Единая транспортная система и автомобильные перевозки.1984

[6] Блинкин А.Я. Харпов С.Х. Количественная оценка эффекта повышения регулярности движения на городских автобусных маршрутах. 1982.

[7] Блинкин М.Я. Кириченко В.А. Михайлов А.А.Сарычев А.В. Оценка соответствия провозных возможностей спросу на перевозки//Совершенствование организации и управления перевозочным процессом на пассажирском автомобильном транспорте. 1986

[8] Богумил В.Н. Как решить проблему обеспечения безопасного функционирования наземного пассажирского транспорта. 1999

[9] Багдасаров А.М. Пассажирский автомобильный транспорт и организация его работы за рубежом. 1983

ПРИНЦИПЫ ЭКСПЛУАТАЦИИ И ТЕХНОЛОГИИ ВЫСОКОСКОРОСТНОЙ МАГИСТРАЛИ

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Аннотация. Начало работ по высокоскоростной магистрали стало реальным технологическим вызовом. Поскольку речь идёт о новом высокотехнологичном железнодорожном объекте возникает потребность в принципиально новых инженерно-технических решениях, инновационных подходах к проведению изысканий, проектированию, строительству и эксплуатации нового подвижного состава и инфраструктуры.

Ключевое значение в создании высокоскоростной магистрали приобретает высокая точность при проектировании, строительстве и содержании железнодорожного пути. Проведённый специалистами тщательный анализ опыта ведущих мировых организаций Китая, Японии и европейских стран, специализирующихся на создании и эксплуатации высокоскоростной магистрали, свидетельствует о том, что наиболее эффективным системно-техническим решением является переход к использованию высокоточных координатных методов проектирования, строительства и управления содержанием инфраструктуры и подвижного состава.

Именно высокоточные координатные методы открывают путь к переходу на эксплуатацию инфраструктуры в проектном положении. А это, по мнению ведущих мировых экспертов, возможность сокращения затрат на текущее содержание столь дорогостоящей инфраструктуры на 20–30%. Техническим решением, обеспечивающим применение координатных методов в «сквозном» технологическом жизненном цикле объектов инфраструктуры, является создание вдоль направлений высокоскоростной магистрали высокоточной координатной системы.

Ключевые слова: высокоскоростная железная дорога, перевозчики, 30 развитых стран, экономика, трансконтинентальный транзит, сеть

ЖОҒАРЫ ЖЫЛДАМДЫҚТЫ ТЕМІР ЖОЛЫНЫҢ ЭКСПЛУАТАЦИЯЛЫҚ ПРИНЦИПТЕРІ МЕН ТЕХНОЛОГИЯЛАРЫ

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Аңдатпа: Жоғары жылдамдықты магистраль бойынша жұмыстардың басталуы нақты технологиялық сын-тегеурінге айналды. Жаңа жоғары технологиялық теміржол объектісі туралы сөз қозғалатындықтан, жаңа инженерлік-техникалық шешімдерге, іздестірулер жүргізуге, жаңа жылжымалы құрам мен инфрақұрылымды жобалауға, салуға және пайдалануға инновациялық тәсілдерге қажеттілік туындайды.

Жоғары жылдамдықты магистралды құруда теміржолды жобалау, салу және күтіп ұстау кезіндегі жоғары дәлдік маңызды мәнге ие болады. Мамандар жүргізген жоғары

жылдамдықты магистралды құруға және пайдалануға мамандanған Қытайдың, Жапонияның және Еуропа елдерінің жетекші әлемдік ұйымдарының тәжірибесіне мұқият талдау ең тиімді жүйелік-техникалық шешім инфрақұрылым мен жылжымалы құрамның мазмұнын жобалаудың, салудың және басқарудың жоғары дәлдікті координаттық әдістерін пайдалануға көшу болып табылатындығын көрсетеді.

Түйінді сөздер: жоғары жылдамдықты темір жол, тасымалдаушылар, 30 дамыған ел, экономика, трансконтиненталдық транзит, желі.

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ENSURING TRAIN SAFETY ON HIGH-SPEED RAIL-HIGHWAY

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ENSURING TRAIN SAFETY ON HIGH-SPEED RAIL-HIGHWAY

Abstract: Modern high-speed trains in normal operation develop speeds of up to 350-400 km / h, and in tests they can even accelerate to 560-580 km/h. Due to the speed of service and high speed of movement, they seriously compete with other modes of transport, while maintaining such a property of all trains as low cost of transportation with a large volume of passenger traffic. For the first time the regular movement of high-speed trains began in 1964 in Japan under the Shinkansen project. In 1981, VSNT trains began to run in France, and soon most of Western Europe, including even the island of Great Britain, became connected by a single high-speed rail network. At the beginning of the XXI century, China became the world leader in the development of a network of high-speed lines, as well as the operator of the first regular high-speed maglev.

In Russia, the regular operation of high-speed trains "Sapsan", on common tracks with conventional trains, began at the end of 2009. Since 2013, the idea of building the first specialized high-speed railway Moscow-Kazan (cargo-passenger) for the national high-speed traffic system has been discussed.

Most of the high-speed trains carry passengers, but there are varieties designed for the transport of goods. For example, the French service La Poste has used special TGV electric trains for 30 years, which served to transport mail and parcels (their operation was completed in June 2015 due to the decrease in the volume of mailings in recent years).

Keywords: high-speed rail-highway, carriers, 30 developed countries, economy, transcontinental transit, network