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## THE PROPOSAL OF HIGH-SPEED RAILWAY LINES IN SLOVAKIA

**Summary.** The paper presents up-to-date possibilities of leading of high-speed railway lines through the territory of Slovakia, which were proposed with the aim to enable their attachment to the corridors in north-south and east-west directions. Then it gives a survey of running times for design speed  $V=250$  km/h on the northern route of high-speed lines.

## PROPOZYCJE LINII KOLEJOWYCH DUŻYCH PRĘDKOŚCI NA SŁOWACJI

**Streszczenie.** W artykule przedstawiono obecne możliwości przeprowadzenia linii kolejowych dużych prędkości przez terytorium Słowacji, zaproponowanych po to, by umożliwić ich udział w korytarzach transportowych północ-południe i wschód-zachód. Podano również przybliżone czasy przejazdu pomiędzy stacjami na północnej linii dużych prędkości dla projektowanej prędkości 250 km/h.

### 1. INTRODUCTION

The successful use of high-speed lines in various states of the world, in Europe and mainly in France witnesses of deserved renaissance of railway transport. The progressive railway administrations have realized that fast railway transport has its future and that only fast, safe, in all weather conditions reliable, economically, energetically and ecologically not demanding railway transport can compet with other kinds of transport and it can be also a guarantec of the progressive development of a state. It's clear that mass and fast railway transport has not only inner-state significance but high-speed lines have to be gradually integrated into the inter-continental network, which will enable fast mass transport of passengers and chosen goods.

The railway system of the Slovak Republic also takes part in this process of integration into the mentioned developing network. The development of HSL can't be viewed only from our local point but first of all from the point of attachment to the main international railway routes.

Slovakia is relatively a small country, if we take into consideration its population and area, but its location in the Central Europe predestinates it to connect single routes of HSL in its both north-south and east-west directions. Slovakia is situated among the states, which surround it, in the north it's Poland, in the south it's Austria and Hungary, in the east Ukraine and in the west the Czech Republic. As a result of it we in our republic have been concerned with the studies, dealing with possible proposals of leading routes for high-speed lines for longer time.

## 2. THE OBSERVED PROPOSALS OF ROUTES FOR HIGH-SPEED LINES

The first more extensive and complex view on this problem had been already drawn up in our country in 1978. Of course, all more significant studies dealing with this problem had been elaborated for the united Czechoslovak Socialist Republic up to the year 1990. In this period the proposals of solutions of high-speed lines had been orientated mainly towards inner-state needs. After the division of one republic into 2 states, since the year 1993 the proposals of leading of high-speed lines were solved for the Czech and Slovak Republic separately. The original unified conception of HSL was divided and each of the established republics started to push through new priorities in the solution of proposals of HSL.

In Slovakia we've also started with solving of the proposals of supposed routes for HSL and besides already prepared variants we've started with an observation of new suggestions. A new situation in the possible leading of high-speed lines has already appeared in the latest elaborated proposals, which were shown to the Transport Ministry at the end of the year 1997.

### 2.1 The New Proposals of Routes for HSL

In Europe there are known 2 systems of HSL with different technic and trafico-technologic parameters-a system only for passenger traffic (France) and a system for mixed traffic (Italy, Germany).

In conditions of the Slovak Republic the conception of mixed traffic seems to be more proper because of the following reasons:

- mixed traffic is proposed also for the routes of neighbouring states, which other routes of HSL are attached to
- a size of built-up structures of SR in the main urbanized corridors is supposed to be less than 1. mil. of inhabitants (100-800 thousand) and it doesn't creat presumption of strong freight traffic volume.

The accepted conception of mixed traffic of HSL in SR takes into account the use of fast sets for passenger traffic with speed to 250 km/h , express trains with ordinary sets (including ordinary and sleeping coaches) with speed to 200 km/h and fast goods trains with speed to 160 km/h.

The proposal of the route was drawn up for line speed  $V=270$  km/h , including these basic parameters:

- radius of the direction curve 7000 m for maximum superelevation
- minimum radius 6620 m for maximum superelevation 65 mm

- distance between railway stations approximately 100 km
- basic distance between shunting loops 30 km (in their half distance there are crossovers for speed 160 km.h<sup>-1</sup>)
- maximum upgrade 12,5 ‰
- distance between centres of lines 4,70 m
- effective length of track 700 m
- length of platforms 400 m
- width of track formation subgrade 13,70 m

While the corridor of HSL in the north-south direction can be considered as unambiguous on the route the state frontier with Austria (the railway frontier crossing Bratislava Petržalka -Kitsee) - Bratislava - Trenčín - Žilina - the state frontier with Poland, the corridor of HSL in the west-east direction, besides the same point of attachment to the Austrian railway, provides more possibilities of leading, the route from the territorialo-economic and geomorphologic points of view.

The chosen variants of corridors for routes of HSL in the west-east direction on the territory of SR follow main urbanizing axes of Slovakia in the same direction and in this way they create the basic supposition of their use both for the inner-state long-distance passenger and goods traffic and also for the attachment of economic centres of SR to the superior European traffic system.

In the west-east direction, in the connection Bratislava-the state frontier with Ukraine there are in principle possible 3 variants of direction leading of the route:

- **northern** on the route the state frontier with Austria-Bratislava-Trenčín-Žilina-Poprad-Košice-Čierna nad Tisou - the state frontier with Ukraine (in the section the state frontier with Austria-Žilina it corresponds to the north-south corridor)
- **central** on the route the state frontier with Austria-Bratislava-Nitra-Zvolen (Banská Bystrica) -Poprad-Košice-Čierna nad Tisou-the state frontier with Ukraine
- **southern** on the route the state frontier with Austria-Bratislava-Nitra-Zvolen-Košice-Ukraine with the alternative leading-of the route in the section Nitra-Košice

### 3. CONCLUSION

Our department is concerned with the northern variant of solving of the route for HSL in terms of working upon the grant project „The Modernization of Railway Lines and Railway Stations“. We've chosen this variant because it enables to lead fast trains through our territory in the north-south and west-east directions together in one corridor. The motorway network of SR is led in this corridor too.

In Fig.1 there is given the network of railway lines in SR with the marked northern variant, in the direction of which the new proposal of leading of the route HSL is led too.

This figure clearly shows that there is a possibility of the attachment of routes for HSL in neighbouring states from the Slovak Republic. They can be attached :

- from Bratislava: the Czech Republic (Prague, Berlin), Austria (Vienna), Hungary (Budapest)
- from Žilina: Poland (Katowice, Warszawa, Moscow)
- from Košice: Ukraine (Lvov, Kiev)



Fig.1. The Slovak railway network

Rys.1. Sieć kolejowa Słowacji

In the table 1 for illustration there are given calculated running times in the northern variant of HSL in the sections leading through the territory of SR for speed  $V=250$  km/h. with limitation of this speed in the sections before railway stations, which trains would stop in.

Table 1  
Running Times Bratislava - Čierna nad Tisou (in minutes)

Section	Thither	Back
Bratislava-Trenčín	32.65	32.55
Trenčín-Žilina	21.12	20.77
Žilina-Poprad	33.25	33.00
Poprad-Košice	33.00	34.07
Košice-Čierna nad Tisou	26.31	26.19
<b>Together</b>	<b>146.33</b>	<b>146.58</b>

Finally, I would like to stress that even if the construction of HSL in our country, as the construction of railway lines separated from the existing Slovak railway network, requires

extraordinary cost of investments and some inevitable interferences within environment too. It's necessary to take it into account because it directly influences further development of our state.

## REFERENCES

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## Streszczenie

Sukcesywne wprowadzanie linii kolejowych wysokich prędkości w różnych krajach świata, a w Europie głównie we Francji doprowadziło do renesansu transportu kolejowego. Przyjmuje się, że tylko transport kolejowy, który jest szybki, bezpieczny, niezawodny w każdych warunkach atmosferycznych, ekonomiczny i proekologiczny może konkurować z innymi rodzajami transportu. Linie kolejowe wysokich prędkości, dzięki skróceniu czasu podróży przyczyniają się też do integracji europejskiej. Sieć linii kolejowych Słowacji, z racji swego położenia w Europie bieżąco również udział w procesach integracyjnych.

W artykule zaprezentowano obecne możliwości przeprowadzenia linii kolejowych wysokich prędkości przez terytorium Słowacji. Główny nacisk położono na ich udział w europejskich korytarzach transportowych północ – południe i wschód – zachód. Spośród różnych możliwości usytuowania takich linii wybrano tzw. „wariant północny“, ponieważ umożliwia on przeprowadzenie przez terytorium Słowacji linii w kierunku północ – południe i wschód – zachód wspólnie w jednym korytarzu.