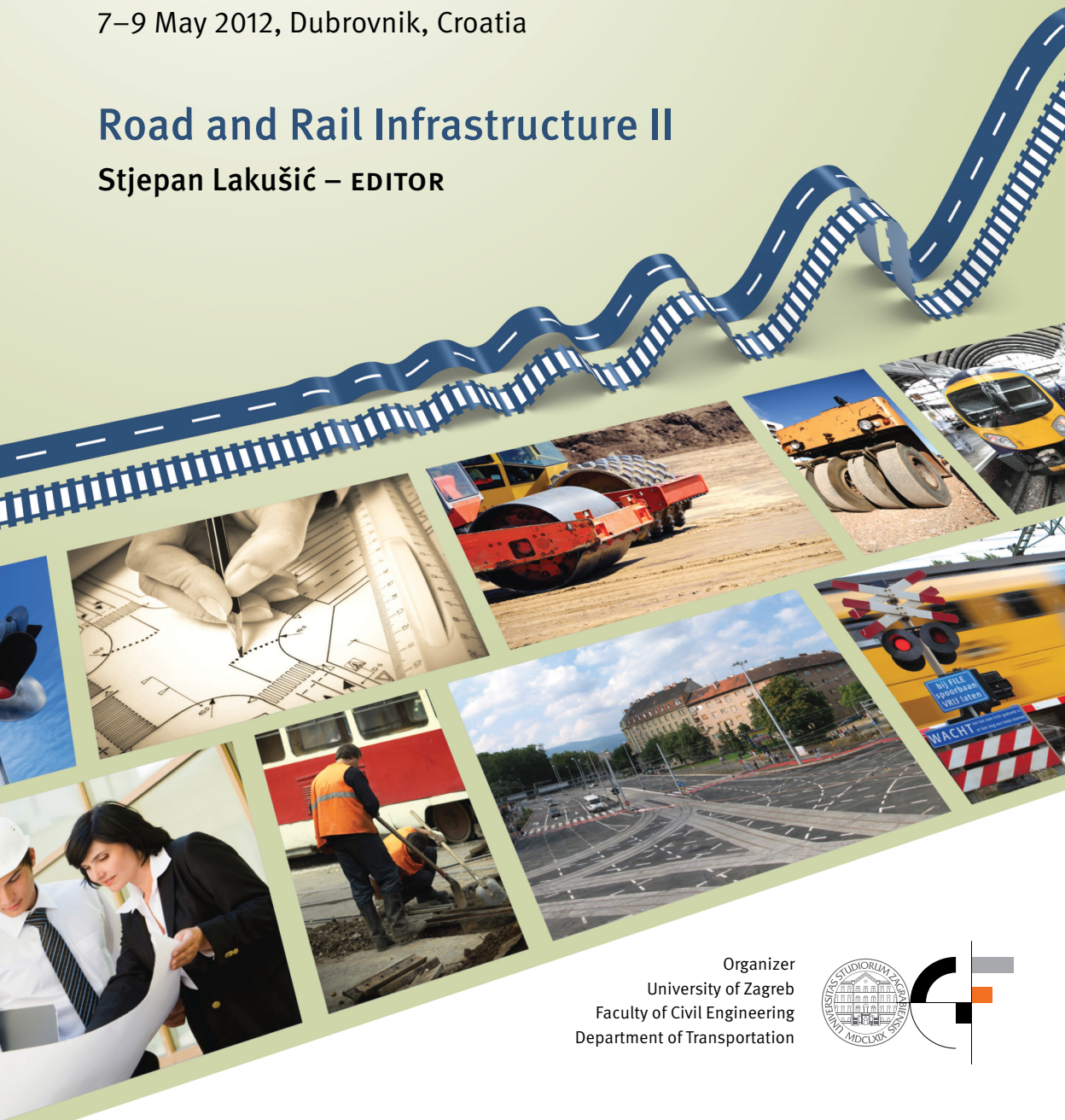
CETRA 2012

2nd International Conference on Road and Rail Infrastructure
7–9 May 2012, Dubrovnik, Croatia

Road and Rail Infrastructure II

Stjepan Lakušić – EDITOR



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THE DEVELOPMENT OF THE INTEGRATED PERIODIC TIMETABLE IN AUSTRIA

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Abstract

More and more, European railways are introducing the Integrated Periodic Timetables (ITF). The idea of the ITF is simple: Trains from different directions meet at hub stations at the same time in regular intervals. Thus optimal connections with short waiting times can be provided. In Austria the first nationwide ITF, the 'NAT91', was implemented in 1991. Only a few ideal ITF–hubs were possible then, because this timetable was introduced without any prior infrastructure improvements. But short– and long–term plans to upgrade the infrastructure were already made at that time. Unfortunately the short term improvements were not carried out, so the NAT91 couldn't be developed further. It was drastically reduced in 1996 and then the ITF–philosophy lost popularity amongst railway managers and politicians.
The new long–term strategy for the Austrian railway infrastructure (the 'Zielnetz 2025+') now again contains a long term ITF goal. The fact, that the first designs for many major infrastructure projects of the 'Zielnetz 2025+' were made already back in the early/mid 1990ies, now helps to plan the future ITF: the upgraded Westbahn between Wien and Wels as well as the new Koralm–line between Graz and Klagenfurt were always designed to fit into an ITF–hub system.

Keywords: timetable; railway; infrastructure

1 Introduction

The Integrated Periodic Timetable (ITF) is based on hubs, where train from various directions meet at the same time. Thus the waiting time for connections in all directions can be shortened, which helps to reduce travel times in the whole network – and not only for certain point–to–point trips.
Therefor, the ITF is the ideal timetable system for countries like Austria, where the population is not concentrated on few very big agglomerations. More than 50% of the population lives in municipalities of less than 7500 inhabitants.
A perfect ITF cannot be implemented from one day to another. To make ITF hubs possible at the needed places (where several railway lines meet), it is necessary to enable travel times of less than 30, 60, 90, etc. minutes between them. Often this is only possible with major infrastructure upgrades, which require a lot of time and money.
In Austria, the first plans to create an optimized ITF similar to the Bahn2000–system were created in the late 1980ies. Unfortunately the consistency to follow these plans was not always as distinctive as in Switzerland. Today the plans for an optimized ITF are more serious than ever before, but it will take some years more until the planned system can be implemented.

2 The history of ITF in Austria

2.1 The first steps: Austrotakt 1982

In Austria the first periodic timetables were introduced in 1978 between Vienna and Salzburg and between Vienna and Graz. In 1982 the periodic timetable was extended to Innsbruck and Villach. The system was called 'Austrotakt' and consisted of four lines, which ran every two hours:
· Vienna – Salzburg – Innsbruck (via Kufstein)
· Vienna – Salzburg (some trains continued beyond Salzburg to Innsbruck via Zell am See)
· Vienna – Bruck/Mur – Graz
· Vienna – Bruck/Mur – Villach
Thus from Vienna to Salzburg and Bruck/Mur an hourly service was provided. Bruck/Mur can be called the first ITF hub at the full hour which enabled connections from Graz to Villach between the lines Vienna – Graz and Vienna – Villach.
However, all other intercity trains and most local trains (except the S–Bahn system of Vienna) kept their traditional timetable with irregular departure times and without coordinated connections. So the benefit was limited to the areas served by the lines mentioned above.
Ideas about a nationwide ITF already existed since the late 1970ies, but they were made by private railway enthusiasts, whereas at that time the planning departments of ÖBB considered a network–wide ITF as an idea of just theoretical relevance.

2.2 From the NAT91 to the NAT2000

Only in the late 1980ies the management of ÖBB changed its attitude towards the network–wide ITF. The Swiss experience with the development of the ITF, the results of a survey by Arthur D. Little about the future development of Austrian Railways and the continuing commitment of private railway proponents finally led to the planning of the NAT91 (Neuer Austrotakt 1991), which was implemented in 1991.
With this timetable regular intervals, better connections and more trains were introduced on wide parts of the network. The NAT91 followed ITF–principles, but it was implemented without prior major infrastructure upgrades, so real ITF–hubs at the full or half hour could be created only at some places (like Innsbruck, Salzburg or Wiener Neustadt).
But the idea of a network–wide system of ITF hubs similar to Bahn2000 in Switzerland was the base for the upcoming modernization plans for the Austrian railways at that time. There were step–by–step plans to improve the NAT91 until the year 2000. Figure 1 shows the planned hub system of the 'NAT 2000' after completion of the infrastructure upgrades [1].

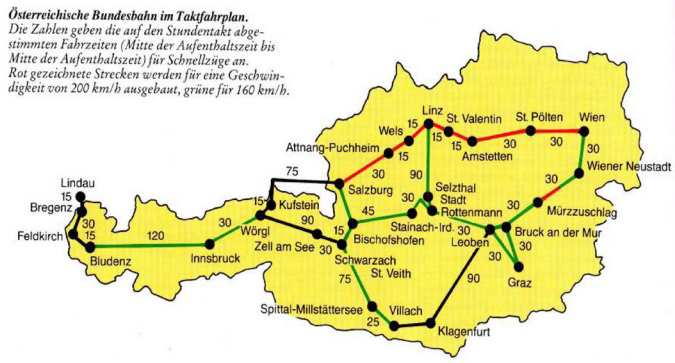

Figure 1 ITF hub system of the planned 'NAT2000' [1].

2.3 Ten lost years?

Although the passenger traffic flow increased by 12% within two years (1990 – 1992), the decision–makers considered the operating costs for the additional train services too high and first cut–backs were made already in 1992.
The planned integration of bus–services didn't happen and also some minor infrastructure upgrades, which would have been needed for the first steps towards the NAT2000, were postponed. This didn't help and finally led to the decision to basically abolish the NAT91 in 1996. The new timetable (called 'Optimierter Personenverkehr (OPV) 96') still followed ITF–principles, but the number of train services was severely reduced. Within two years the passenger flow fell by 18% – all the gains made by the NAT91 were lost [3].
Under these circumstances any thoughts about an offensive timetable strategy as the base for the long term development of ÖBB were practically dead. The focus was laid on the development of freight business.
However, the plans to improve the infrastructure continued, but without a clear long–term network–wide goal for an ITF. Fortunately the ideas and plans for many projects were already created in the early 1990ies – when ITF–compatible travel times were considered a main goal for the infrastructure improvements.
This applies to the upgrading of the Westbahn between Vienna and Wels. Also the first concrete plans for the new Koralm–line between Graz and Klagenfurt, which were not yet mentioned in the NAT2000–plans, were based on a travel time of slightly less than 60 minutes between Graz and Klagenfurt.

2.4 Plan912

The foreseeable completion dates of major infrastructure projects like the new line Vienna – St. Pölten or the new Vienna main station lead to the start of the project 'Plan912' in 2005. It was recognized that a strategic timetable goal was necessary to maximize the use of these infrastructure projects. The title refers to the originally planned main introduction phases in 2009 and 2012. However, some assumptions about the progress of infrastructure projects were too optimistic in the beginning, so some parts of Plan912 are delayed and will be implemented in the next few years.
The Plan912–system already contains full ITF–hubs at St. Pölten, Linz, Attnang–Puchheim and Salzburg on the Westbahn as well as at Wiener Neustadt and Bruck/Mur on the Südbahn. The hubs on the Westbahn were enabled by 200 km/h–operation (instead of 160 km/h) of Intercity–trains, which was introduced in 2008. Hubs are also planned in Vienna (new main station) and in Amstetten (were now some minutes are still missing). From 2015 the hub at Vienna will greatly improve the connections between the different lines radiating from Vienna and shorten travel times e.g. from Bratislava to Linz or from St. Pölten to Graz. Transfer stations will be the new main station and the station Vienna Meidling.
Among other Plan912 improvements were additional trains to the south (Vienna – Graz hourly), between Vienna and Munich (new direct railjet service Budapest – Munich every 3 hours) and between Salzburg and Innsbruck (one train per hour instead of one every two hours). The routes Vienna – Innsbruck – Zürich and Vienna – Villach were accelerated by reducing intermediate stops. Also projects to improve suburban services around provincial capitals (S–Bahn Tirol, S–Bahn Graz, etc.) have been carried out within the Plan912 project.
The improved train services already had an impact on the passenger flow: after a long period of stagnation since 1997 it increased by 23% within the period from 2004 to 2010. [3]

3 New perspectives for the future

3.1 Zielnetz 2025+

In 2007 ÖBB and the transportation ministry decided to create the 'Zielnetz 2025+' ('target network 2025+') – a long–term strategy for the development of the Austrian railway infrastructure until 2025 and beyond, which should enable a better coordination of infrastructure investments and should also be compatible with goals of the Austrian traffic policy.
The 'Zielnetz 2025+' was published in september 2011 and for the first time after more than 15 years an ITF hub system again found its way into the official infrastructure strategy. [2]

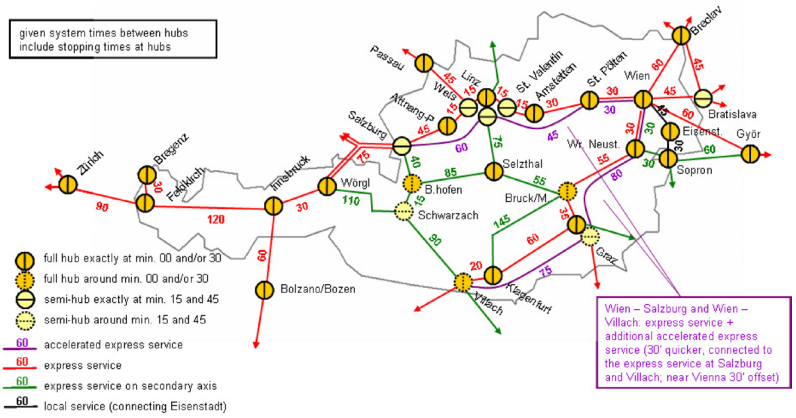

Figure 2 ITF hub system of the 'Zielnetz 2025+'

Some thoughts of earlier concepts like the 'NAT2000' or 'Plan912' can be found also in the Zielnetz 2025+, especially concerning parts of the Westbahn–axis between Vienna and Attnang–Puchheim.
West of Attnang–Puchheim an earlier planned new alignment of the Westbahn is now postponed to a later date beyond the Zielnetz 2025+, but a 15/45–hub in Salzburg can be enabled with a short new line east of Salzburg (Neumarkt–Köstendorf–Salzburg).
Towards the south by the year 2025 the Semmering–tunnel and the Koralm–line form a new attractive axis with ITF–compatible travel times.
Whereas earlier concepts focused on domestic services, the Zielnetz 2025+ also takes international connections into account. ITF–compatible travel times to nearby hubs in Breclav, Bratislava or Györ are the base for international coordination of the national ITF–systems. They also helped to decide the necessary design speed for lines, which will be upgraded in the future: For example, the question of 160 vs. 200 km/h on the Nordbahn from Vienna to Breclav could only be answered with the knowledge of the necessary travel time. 160 km/h proved to be fast enough, so a lot of money could be saved.
The system now also included two different categories of express services on the main–axis between Vienna and Salzburg and between Vienna and Villach. Accelerated services don't need to serve all intermediate hubs, but are connected to the basic system on both ends of the accelerated section. The accelerated trains are those who are designed to continue beyond Villach and Salzburg to places like Venice and Innsbruck/Zurich. Thus the principles of the ITF can be combined with the requirement for accelerated services to reduce travel times on longer routes (like Vienna – Innsbruck).

3.2 Timetable 2025

Currently the main focus is laid on the design of an exact system timetable for the year 2025. As not all projects of the Zielnetz 2025+ will be finished in 2025 due to financial restrictions (hence the 'plus' in the title 'Zielnetz 2025+'), the hub–system of the Zielnetz 2025+ had to be modified a little bit around Salzburg and in the west of Austria.

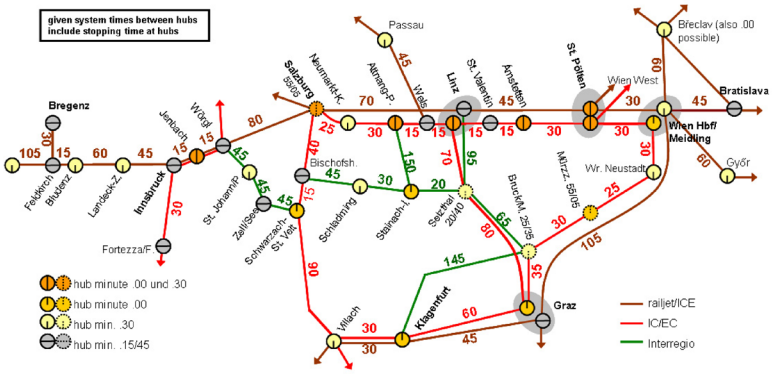

Figure 3 Planned ITF hub system for 2025 – based on the Zielnetz 2025+

Salzburg will continue to be a hub at the full hour. On the Westbahn between Vienna and Salzburg the ITF is based on the Plan912–strategy. The Tauern–line from Salzburg down to Villach (travel time slightly less than 2½ hrs) defines the further hubs on the new 'Südbahn' between Villach and Vienna via Graz. Travel times of 1¾ hrs from Vienna to Graz and 2½ hours to Klagenfurt will be faster than going by car and are also the basis for better international services from Vienna to Italy, Slovenia and Croatia.
The cross–country links through the Alps will be provided through a new system of 'Interregio'–trains. The upgrade of the Pyhrnbahn (between Selzthal and Linz) also gives a new perspective to the Graz–Linz line with a travel time of just 2½ hours (eventually not yet possible in 2025, but at a later time) and optimized connections to Nuremberg via Passau. The future ITF will enable significant travel time reductions for many city–pairs. Table 1 shows the travel time reductions between provincial capitals. It can be seen that especially the new Südbahn (Semmering tunnel and Koralm–line) and the improved connections via Vienna greatly reduce travel times – Graz, Klagenfurt and Eisenstadt will see the most significant reductions.

Table 1 Travel time reductions 2012/2025 between provincial capitals

Travel time reduction 2012-2025 [hh:mm]									
	Wien Hbf	Eisenstadt	St. Pölten	Linz	Salzburg	Innsbruck	Bregenz	Graz	Klagenfurt
Wien Hbf									
Eisenstadt	-00:20								
St. Pölten	-00:10	-01:10							
Linz	-00:20	-01:20	-00:10						
Salzburg	-00:20	-01:20	-00:10	-00:05					
Innsbruck	-00:25	-01:25	-00:15	-00:05	-00:05				
Bregenz	-00:35	-01:35	-00:25	-00:15	-00:15	00:00			
Graz	-00:50	-00:50	-01:15	-01:00	-00:30	-00:45	-01:00		
Klagenfurt	-01:25	-01:40	-02:15	-00:55	-00:15	-00:25	-00:40	-01:15	

The ITF–hubs of the 2025 timetable, which will be implemented in the whole ÖBB network, will be the base for optimized connections also to local and suburban services. Thus travel time reductions will not only occur on main lines, but will be noticeable in wide parts of Austria. Figure 4 shows the principle of an optimized ITF–hub in Amstetten, were changing between all kind of trains will be possible within a few minutes.

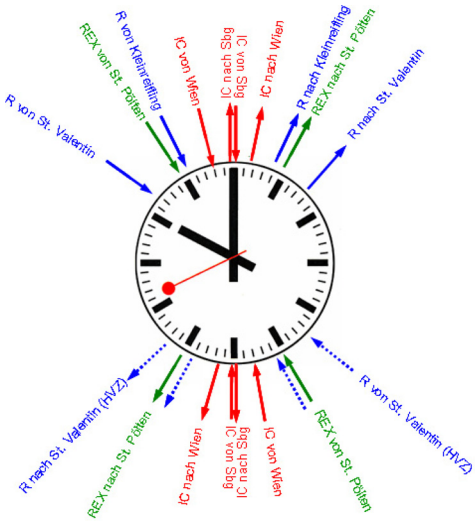

Figure 4 Example of the future ITF–hub Amstetten based on half–hourly services.

4 Conclusion

The ITF in Austria already has a long history with some ups and downs. It finally seems that in the next few years it will become reality. The fact that many major infrastructure projects were designed according to ITF requirements helps to create a network–wide ITF system until 2025, even if sometimes the initial ideas were temporary forgotten.
The Austrian example shows that the first concepts of major infrastructure projects determine the future possibilities. It is therefore very important to consider ITF principles from the beginning.
The fact that the perfect Austrian ITF will hopefully be realized by 2025 and thus be delayed by 20 years compared to Bahn2000 in Switzerland also shows the need for pursuing a goal consequently – which did not always happen in Austria.

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[3] UIC railway statistics, http://www.uic.org/spip.php?rubrique1449, 25.03.2012