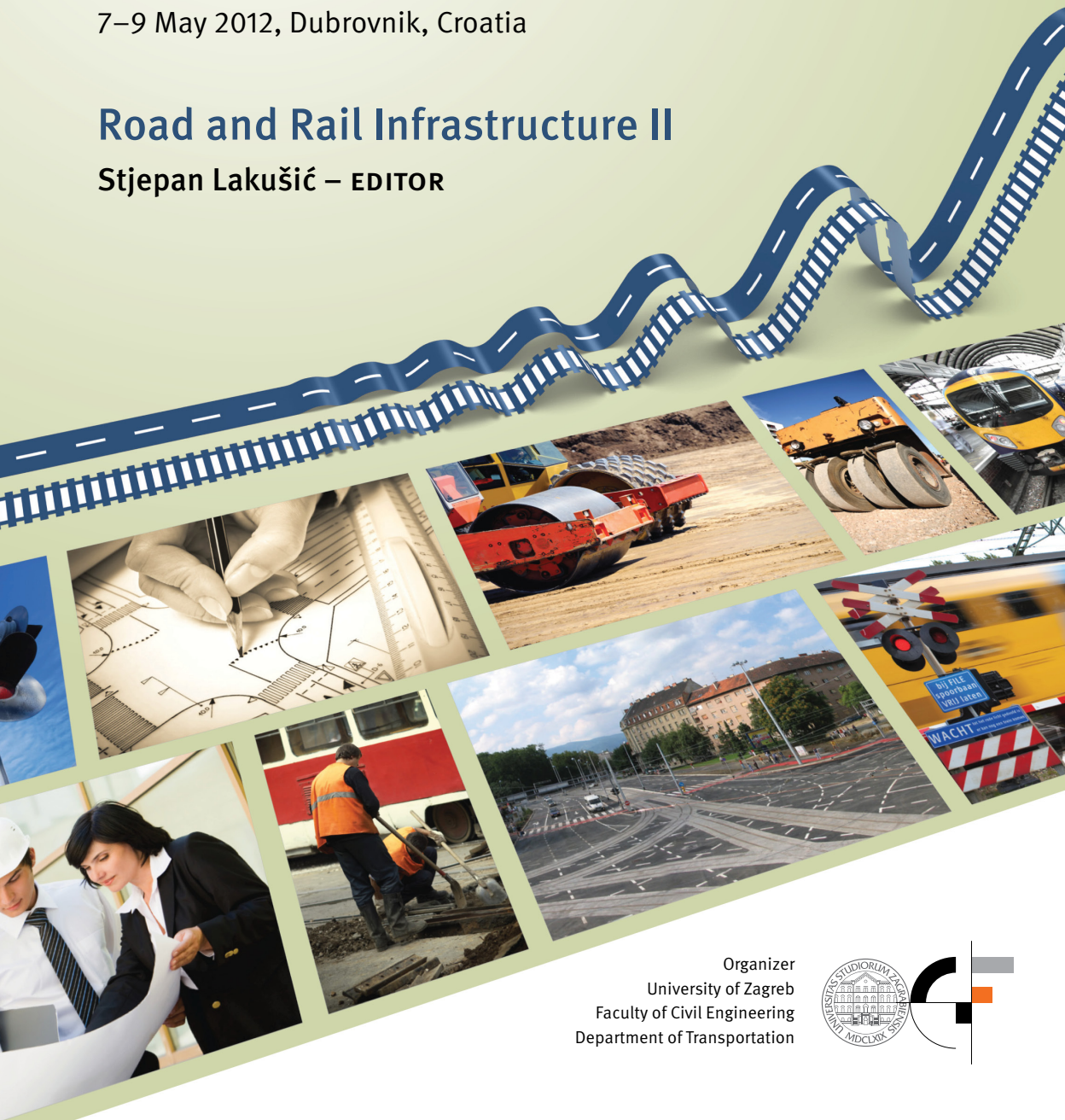
CETRA 2012

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 IMPORTANCE OF INDUSTRIAL TRACK IN RAILWAY INFRASTRUCTURE

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Abstract

An important part of the railway infrastructure in the area of freight transport designed to simplify the transportation process and benefit the economy of an area are industrial tracks. Industrial tracks provide different benefits to users and railways. Enable customers to deliver the goods in the factory, avoiding the cost of loading and a lower total cost of transportation, a rail unloading station, reducing the work operations at railway stations, increasing passenger safety and reduce traffic congestion near the station. While in the economically developed countries the number of industrial tracks and their utilization is significant, in less developed countries the number of industrial track is a bit smaller. According to data from 2009 at the Croatian railway network, there were 314 primary industrial tracks, although only 168 of them in greater or lesser extent perform manipulative actions. The remaining 146 of the track has been temporarily closed and inactive. Closure and abandonment of some industrial tracks is caused by the changes in the economy and the real needs of users. Although the existing industrial intersections generates about 70% of total freight transport, are noticeable problems with the technical condition of the track, an organization working on them and the relationship of railroads and industrial users of the track. Retention and renewal of existing and construction of new industrial track, it would be possible to increase the competitiveness of rail compared to other modes of transport.
This paper describes the characteristics of the industrial tracks with special emphasis on the construction of an industrial track for the cement factory Našicecement in Našice. Construction of the track allowed the multiple benefits: shorter transport time and energy saving, rational use of means of transport and labor, reducing transport costs, increase traffic safety and reliability of the transport system and increasing the competitiveness of factories in the market.

Keywords: industrial tracks, rail freight, users, benefits

1 Introduction

An important part of the railway infrastructure in the area of freight transport is industrial tracks, designed to simplify the transportation process and benefit the economy of an area. The main purpose of these tracks is to connect the nearest railway stations with a large manufacturing and industrial plants, mines, ports and harbors, and thus allow easy delivery of massive goods (mainly iron, coal, wood). In recent times, due to the reduction or termination of mass industrial goods, industrial tracks serving other industries such as commercial companies, storages and transshipment terminals.
Industrial tracks are special railway tracks whose length of main siding track can be from several hundred meters to few kilometers, at the end of which one track can branched into

several. In accordance with the Law Railway Safety [1] industrial track is defined as a railway track that is not a public property and not in public use, connected to the railway line, used for entering and leaving goods on rail vehicles for the owner of that track and used by the industrial railway for transport for their own use. Regulation of conditions for safe railway traffic [2] defines industrial tracks as an industrial railroad track that connects in the railway station or on the open railway section and is used by holder of the rights of use.
Industrial tracks provide different benefits to users and railways: allow users to deliver the goods in the factory, avoiding the cost of loading and a lower total cost of transport. For railway, reducing overloading and working operations of railway stations, increase passenger safety and reduce traffic congestion near the station. By its technical characteristics, industrial tracks are often not at the level of railway traffic intended for the public traffic. At the industrial track valid are business regulations agreed between the rail and users [3].
Although the industrial tracks should be used at the beginning and the end of the transport process, so they should allow continuity of traffic, they often exploit only one of the cargo operations (loading or unloading of goods from the wagons). Such limitation of industrial track usability could be avoided by expanding and modernizing the network of tracks wherever possible.

2 The importance of industrial tracks

The importance of industrial tracks is primarily the simplification of the transport process. By joining the factory industrial tracks preclude the need for the participation of motor vehicles operations, provide transportation service 'door to door' thereby increasing the competitiveness of rail transport. Benefits for users are numerous: the direct delivery of goods is less time consuming because of machinery use and less handling (especially important for loose load), less costs or damage of goods since reloading is not needed using only railways, enabled saving on the cost of loading or unloading using their own machinery and ultimately lower overall transportation costs. Benefits for the railway are: direct trains are using industrial tracks because the need to transport large quantities of goods, minimizing congestion at the station manipulative tracks, short time for wagons handling, direct linking of internal and international railway transport and creating a habit of using rail transport links with permanent large users [4].
Developed European countries have well–developed industrial railway infrastructure. Besides the desire for greater security, long–term transportation and safe delivery, the development was accelerated by the fact of a price increase of truck transport in Europe due to increasing fuel prices and tolls as well as the European directive on limited working time for truck drivers. A large number of European companies owns and extensively uses industrial tracks. Some of them, like Germany's BASF chemical producer, even built their own industrial railway station and many tracks with smaller container terminal, all as effort of building a complete delivery network and achieve the best transport efficiency [5].
The situation in the economically less developed countries is quite different: a much smaller number of the industrial tracks most of which are in poor condition due to inadequate maintenance. This was due to many factors, particularly bad development of economic areas and poor planning of transport infrastructure. Unfortunately, existing state of industrial tracks in Croatia cannot be called satisfactory.

3 Condition of industrial tracks in Croatia

Analysis of the distribution of industrial tracks in total extent of loading and unloading of goods shows a very large share of industrial tracks, even up to 85%. This is evidence of their importance for rail freight transportation in Croatia.

According to data from 2009 [4], Croatian railway network recorded 314 primary industrial tracks, although only 168 of them in greater or lesser extent perform manipulative actions. The remaining 146 track is temporarily closed and inactive. Closure or abandonment of certain industrial tracks is caused by the changes in the economy and the real needs of users. Industrial tracks are privately owned by various companies, mainly for large customers in the area of sea and river ports, oil companies, cargo terminals and companies involved in manufacturing, where exists a need for mass transportation of goods.
Problems related to the operation of industrial tracks are primarily related to the technical condition, construction and maintenance, then the organization of work on industrial track, the relationship between railroads and the owners of industrial tracks and abandoned industrial tracks.
The technical condition of most industrial tracks is not very well. Most of all tracks in Croatia were built 30 years ago; permissible axle load on them is small and prevents the maximum utilization of wagon loading capacity increasing their required number. Only 15–20 industrial tracks of large customers is in good technical condition: average static loading wagon is 42 tones per wagon which is substantially greater than 31 t load rail station tracks.
Maintenance of industrial tracks is done at low level, in order to maintain minimum operating conditions. Such a restrictive maintenance has effect of lower projected levels of elements, the exploitation of tracks that should be nearly closed and frequent extraordinary events such as slippage of wagons, which creates additional damage. Most industrial tracks require reconstruction, repair and enhanced maintenance. During reconstruction of the superstructure and subsoil, also on existing buildings on the track route, reconstruction costs are substantially increasing.
Often happens that work organization of the industrial tracks and their confrontation to rail station tracks that technological processes are not aligned. On many industrial tracks outdated equipment is used. Further, the relationship between railways and users (or owners of industrial tracks) is not on sufficient level what threatens the possibility of further cooperation. The problem is evident in the absence of a clear strategy for development of industrial tracks. From 15 free zones in Croatia, 10 of them located maximum one kilometer from the railway infrastructure but only three industrial zones have internal tracks. From 112 enterprise zones only 65 are using railway infrastructure as part of its transport links.
Based on the analysis of the actual situation of industrial tracks 'Alliance for the railways' in 2010 started with project about revitalization of industrial tracks [6], primarily in free and entrepreneurial zones. The project objective was to encourage legal changes and to define concrete measures in the construction of railway infrastructure. For this purpose, project proposed five different models of new approaches to construction and renovation of industrial tracks [5] which may act individually or collectively. Common to all models is giving incentives to local and state authorities in the construction and reconstruction of the track. This would increase the share transfer on industrial tracks, also increased the share of rail transport in total transport, which would result in significant savings in the maintenance of transport infrastructure and reducing environmentally harmful effects of exhaust gases and noise.
The remainder of this paper will describe the construction of an industrial track for the purposes of cement factory Našicecement in Našice, town in east part of Croatia.

4 New industrial track for the cement factory Našicecement in Našice

Cement factory Našicecement (Fig.1.), which operates under the 'Nexe group' is the most modern and the only cement factory in continental Croatia. Production of over one million tons of cement per year required the supply and shipment of large load quantities, which resulted with building of special, industrial track for the factory. According to the factory plans, annual production volume of over one million tons of cement and clinker, need more than 500.000t load (gypsum, slag, fly ash, coal, cement, clinker) transported by railway [7].

Figure 1 Cement factory Našicecement [7]

According to the Rules of the technical requirements for the rail traffic safety [9] 'special track attached to the open railway section' is a railway track which is a public property in general use, connected to the railway line and used for entering and leaving goods by railway vehicles for transport users. Special track for cement factory was constructed in two sections (Fig.2). The first section is a special track attached to the open railway section; investor is HŽ Infrastruktura d.o.o Zagreb (HŽ Infrastructure Limited Liability Company for Management, Maintenance and Building of Railway Infrastructure). A special track starts at the beginning of the disconnector switch in km 4+999.87 on railway line Našice L206-Nova Kapela/Batrina, and ends in km 3+645.63 on the last switch of transceiver group.

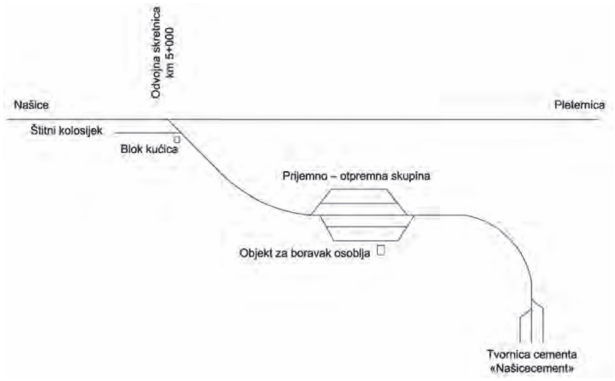

Figure 2 Shematic review of a section of special track [7]

The second section is an industrial track in which is investor company Našicecement. The section starts from the end of a special track at km 3 +645.63 and ends at km 4 +512.068 where are loading–unloading groups of tracks in the production plant factory Našicecement. Before the start of construction work on a special track, the route along the length of 4.8 km from the rail station Našice to the branch switch is reinforced and bearing capacity is increased on the category C4 (20 t/a, 8 t/m'). That was necessary because of poor condition and reduced bearing capacity in open railway section L206 Našice–Nova Kapela /Batrina.
Special track Našicecement is separate with switch in km 4+999.87 from the railway line L206 Našice Nova Kapela/Batrina (km 0 +000 special track), and is designed for speed V_{max} = 50 km/h and maximum permissible load categories D4 (load 22.5 t/a and 8 t/m').

In km 0+073 of special track, a protective switch was built in with protective track to prevent uncontrolled release of trains from special track on open railway track. From the protective switch track route is made by circular arcs R_1=300m i R_2=400m which are connected with lines of different lengths. Vertical alignment of track is in continuous longitudinal grade of -7 ‰.
The route of the track is laid on the hilly, forested terrain, unfavorable geologic and geotechnical characteristics with very low bearing capacity and high instability.
On the route are many cuts and embankments, some higher than 12 or 15m. Due to the height of cuttings and geotechnical characteristics of the terrain contractors have met with a number of unforeseen works specifically on the stabilization of slopes, which is significantly slowed the dynamic of works.
There are four reinforced concrete bridges along the route, three bridges have a span of 6m for forest roads needs, and one has a span of 8.4 m for a local road. Also, there are 13 pipe culverts with diameters 100 and 200 cm; some are longer than 48 m.
On the plateau transceiver group from km 3+064 to km 3+645.634 five rail stations tracks are built with a usage length of 420 to 480m, accommodation facilities for staff and an access road and parking for cars, vans and heavy goods vehicles.
From the rail station Našice to transceiver group a safety signaling and telecommunications infrastructure was built, what enables remote setup times and run branch of the disconnector and protective switches from rail station Našice (Fig. 3).
Special track is designed for load category D4 (permissible vehicle load 22.5 t/a, and 8 t/m'), with rail type 49E1 on concrete sleepers of type PB85K-49,on formation level track width 6.5m, sub base thickness 20 cm and crushed curtains (Fig. 4).
Preliminary work on the special track realization began in September 2006. Realization of construction works of special track started in August 2008, and completion of work ended in December 2011. In this moment the activity taking place on procuration of operating licence.
Total value of financial resources that are invested by the HŽ Infrastruktura Zagreb, which includes the extension of track formation and repair from the rail station Našice to km 5+000 on railway line L206 Našice–Nova Kapela/Batrina and construction of special track from km 0+000 to km 3+645 is estimated at around 130 million HRK (equal to 17, 3 million EUR).

Figure 3 Disconnector switch on special track

Figure 4 Special track of cement factory Našicement

In parallel with the construction of a special track (investor is HŽ Infrastruktura Zagreb), Našicecement is built an industrial track on the second section, where the works are also completed. This section presents for Našicecement first phase of construction, which was aimed to ensure the necessary conditions for transport of the raw materials to the factory and the works included were valued around 26 million HRK (equal to 3,5 million EUR). In the following period, until 2014 Našicecement provides complete Phase II which will allow the removal of cement from the factory building of additional infrastructure to transport systems, cement silos for loading and scales. The value of the second phase of works is estimated at 50 million HRK (equal to 6,6 million EUR) [8].

5 Conclusion

The construction of a special track for the cement factory Našicecement enabled multiple benefits: shorter transport time and energy saving, rational utilization of transport and labor, reducing transport costs, increasing traffic safety and reliability of the transport system and increasing the competitiveness of the factory on the market.
The idea of building a special track is common interest of factory Našicecement for cheaper and environmentally acceptable transport and interest of HŽ (Croatian Railways) to transport large amounts of cargo. Such an approach, with clearly defined common interest of users and the HŽ (Croatian Railways) is possible prerequisite for network expansion and modernization of industrial tracks as well as increase the volume of rail freight transportation.

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