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STANDART REQUIREMENTS AND CONDITIONS OF RAILWAY TRACK INSIDE LINES IN MP DEBELT

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SUMMERY
It presents research of railway track regarding with publishing a "Complex technology for work at industrial area in MP Burgas", 1990. The problems of inside railway lines are actual now with regarding recommendation of railways and bad condition of railway track. A summery of problems leads to conclusions in the following directions:

- Proposals for modifying of standards and conditions.
- Proposals for decisions regarding with track maintenance and organisation of capital repairs.

Kay words: designing, railway and track maintenance.

INTRODUCTION

Inside railway lines possess a number of special features in comparison with normal-gauge railway:

- They are constructed and operated for needs of some industrial company, accordingly with her technology of work.
- They have a temporary character and are subordinated of standards and conditions, different from these in use in railway administration.
- They are maintenance by special group in the plant, but special companies do capital repairs.
- Loads and pollution are differing from operating conditions in railway net.

At the base of comparison with existing railway net, structure and special features of the railway line, connecting MP Debelt (Promet) with st. Dolno Ezerovo, is checked. Conclusions and deductions have a more general application about inside lines in Maritza – Iztok, Kremikovtzi and so on.

GENERAL CHARACTERISTIC AND FEACHERS OF THE RAILWAY TRACK

Inside railway lines are basic kind of inside industrial transport. The first railway tracks origin for the needs of industry. Industrial lines are divided into outsides and insides.

Outsides railway lines

They connect the main railways with the plant. In accordance with speed they are classified. The highest in three different categories is I-st (speed from 40 to 65 km/h). Outside railway lines in MP Debelt beginning from st. Dolno Ezerovo to st. Metal (Table 1 and 2).

Table 1. General length – outside lines

Railway section	D. Ezerovo – Vaia	Vaia - Ravnetz	Ravnetz - Debelt	Debelt - Metal	General length, m
Length, km	1,600	8,700	9,840	3,410	23,650
Reduced length	1,678	9,080	10,211	4,540	25,509

Table 2. Railway lines – station tracks

Station	Vaia	Ravnetz	Debelt	Metal-outsides	Metal-insides	General
Km	0^{+000}	11^{+235}	22^{+000}			
Station tracks	4,460	1,000	6,270	2,200	2,200	6,438
Reduced length	9,000	1,000	13,175	4,395	4,395	13,620
R. switch	20	2	47	13	13	45

Ground bed and geometry of the railroad are designed for 130 km/h. Only the variants, connecting with st. Dolno Ezerovo are designed for speed of 40 km/h. Curves with radius 350 m and 265 m are permitted.

Inside railway lines

They service production of plant (Table 2, Metal - inside). The technological processes in plants, especially in metallurgical ones influence the construction of the track and features of their exploitation. The minimal radius of curves might reach up to 60-100m. Even in low speed, the loading up of outside rails from centrifugal forces in large. In MP Debelt, minimal radius of the horizontal curves is 190m. It corresponds railway switches to the used 49-1:9-190m. The crossings with roads in one level, inside the plant are 8 and the outside of plant – 9, but in the area of inside railway lines in st. Metal.

CONSTRUCTIVE CONDITIONS AND GEOMETRY OF RAILWAYS TRACK

Outside railway lines are designed for maximal speed of 130 km/h. In accordance with prognosis loads, the railway must be to the I-st category of main railway (Table 3).

Table 3. Superstructure

Element	Description
Rails	type S49, 25m, standard-gauge road
R. Clips	РАК 68И (type "К")
Sleepers	ST4, 1480 sl./км (in straight) 1600 sl./км (in curve)
Ballast prism	40 cm, type IV by TU
R. switch	type 49-1:9-190; 49-1:7-190; 49-1:9-300

In practice, from the beginning of plant, there are no loads close to prognoses. In the section, only goods trains with considerable smaller speeds, move. Therefore, the railroad is builder with very high requirements and his construction doesn't answer to real the conditions.

The longitudinal section of railway could be seen on fig.1 and fig.2. The elevation course is accepted at 0,72m under railhead level. Elevations are from Baltic benchmark. The maximum longitudinal slope is 15‰, according to the standards of designing of railway lines of I-st category.

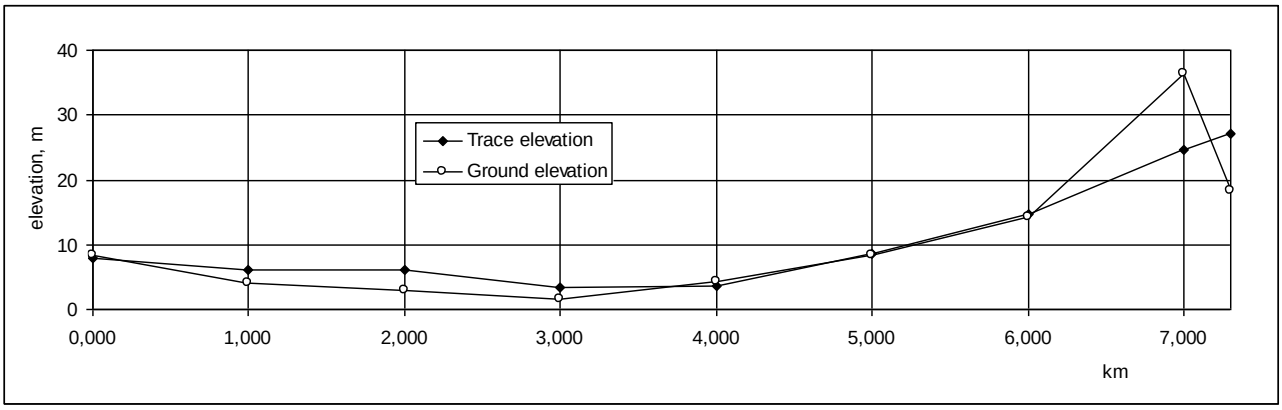

Figure 1. Dolno Ezerovo – Debelt - Plant km 0^{+000} – 7^{+300}.

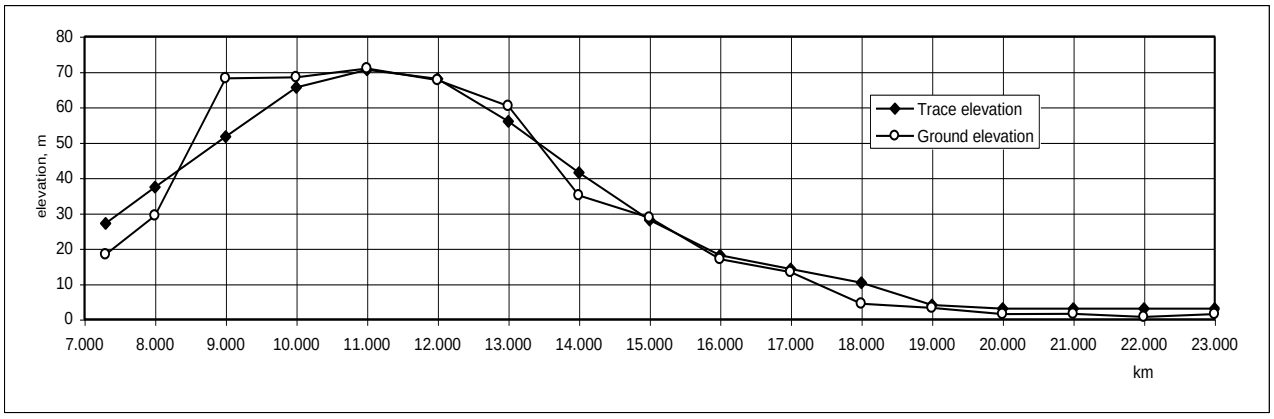

Figure 2. Dolno Ezerovo – Debelt – Plant km 7^{+300} – 23^{+000}.

Ground elevation is very low. At km 2+000 it reach's 1,51m altitude. After that, it reach's 70,91m at km 11+000 and near st. Debelt, ground level vary from 0,64 to 1,50m. (km 21+000 to km 23+000) at course elevation at 3,00m. These low elevations (close to see level) usually are accompanied with loose soil.

Soil subsidence is appeared to all length of line particular in embankments. Bridge-abutment bankseat in km17+937 is subsidence.

Loose grounds and higher ground water demand to build a lot of water – intake structures (Table 4 and 5).

Table 4. Water-intake structures

Type of culvert	number	General length, m
Assembled culvert L=1,00m	15	15
Assembled culvert L=1,50m	13	19,5
Assembled culvert L=2,00m	10	20
Platy culvert L=1,00m	3	3
Drain culvert Φ=1,00m	1	0,8
General	42	58,30

Railway area is crossed with a lot of roads. There are forests:

- 5 crossing in two levels.
- 2 temporary watched crossing.
- 5 automatic crossing (refused).

Railways crossing in inside lines are 16: 8 in industrial area and 8 near to the plant.

Table 5. Bridges

Type of equipment	km	length, m	General length, m
Reinforced concrete bridge	2^{+272}	3x13,50	40,50
Railway overhead crossing	2^{+318}	8,00	8,00
Railway overpass	2^{+440}	120	120,00
Reinforced concrete bridge	5^{+675}	8,00	8,00
Road underground crossing	6^{+735}	8,00	8,00
Reinforced concrete bridge	7^{+360}	3x12	36,00
Road overhead crossing	7^{+975}	6,00	6,00
Road overhead crossing	9^{+895}	6,00	6,00
Reinforced concrete bridge	11^{+471}	6,00	6,00
Road overhead crossing	14^{+200}	6,00	6,00
Reinforced concrete bridge	17^{+937}	3x13,50	40,50
General			285,00

TRACK MAINTENANCE AND REPAIRS

Track maintenance of line is serviced of personal, working for a plant accordingly publication of Todorov and Nikolov, 2000. Therefore requirement for maintenance for I-st category railway, and a lot of equipment's was rotten reduced length of railway (Table 1 and 2).

Accordingly her and accepted standard is determined necessary number of workers with correspondent qualification. In practice appointment workers and specialists is been 4 to 5 much under necessary. That leads to development of heavy permanent deformation in railway track and shorts inter repair periods.

Capital repairs are made from inside for the plant specialisation repair company.

CONCLUSION

Presented analysis for state of railway track of inside industrial lines in MP Debelt lead to some conclusions:

- Railway line is designed for speed 130 km/h, but goods trains are moved with the maximal speed 60-70 km/h. Only passenger trains must be moved project speed, but they are very little for a industrial railway line. Goods wagons are designed for the maximal constructional speed 70-80 km/h.
- Requirements for track maintenance of railway for 130 km/h are in contradiction with requirements for speed in ratio of size of rise-to-distance ratio and length of transition curve. The contradiction are leaded to no assumed loading, which in combine with loose soil is one of reason for bad state of railroad.

REFERENCES

Комплексна технология за работа на промишлен жп район при МП-Бургас, 1990. – програмен колектив 13/89 с ръководител проф.Райков.

Коссой Ю.М., 1987. Рельсовые пути трамваев и внутризаводских дорог, Москва, Транспорт, 296с.

Тодоров, С.П., Николов В.А., 2000. Технология на ремонтите и текущото поддържане на вътрешнозаводския транспорт в МК–Дебелт, VIII МК на ТУ МОТОАUТО2000, 18-20.10. 2000. София.

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