Marian Hieronim Fijałek: Concept and Technical Specification of the Test Track Centre in Żmigród

In 2016 the Test Track Centre in Żmigród celebrates its twentieth anniversary. The start-up of its operation in 1996 was an important event in the history of Polish railway, which crowned the biggest investment of the then Railway Scientific and Technical Centre. At the same time it was an exceptional event in the history of Polish railway. Currently it is a remote research unit of the Railway Research Institute and one of the few similar objects in the world. The author of the article, being one of main constructors of the Test Track, on the occasion of its twentieth anniversary outlined a history of development of the object, planned scope of realization, construction process as well as its technical specification and destination according to the data from twenty years ago.

Construction of a test track in Poland was considered back in the fifties of the 20th century. Various concepts of such object and locations were analyzed, however no specific decisions were made. Construction of the track was postponed mainly because of economic factors and only in the eighties a real possibility of its construction appeared.

All solutions assumed, that finally the test bed of PKP should consist of at least two track circuits, forming so called „large" and „small" loop, connected to each other and to a rail network. Initially it was assumed that the whole investment will be possible to realize in years 1987–1992 but financial possibilities allowed to build only the small loop.

The construction started in 1987. According to assumptions it was forecasted to be finished within 39 months, during the next nine months it was supposed to be equipped and put into operation. However, the whole process of starting test drives extended to 111 months, i.e. 9 years and 3 months. Putting the track into operation took place in the end of the third quarter of 1996 instead of the second quarter of 1991. Such a long postponement was caused by many factors and circumstances, including the financial situation.

It is possible to distinguish four periods of realization. In the first of them, from the second quarter of 1987 to the second quarter of 1989 the construction process went without interruptions. Financing was in line with the plan. The progress of construction was estimated for c.a. 50%. In the second period, from the third quarter of 1989 to the fourth quarter of 1991 the speed of construction process was halted due to limited financial possibilities. The progress of construction at the end of this period was estimated for c.a. 82%. The third period, from the first quarter of 1992 to the fourth quarter of 1993 was the most difficult one. Various events accompanying the political system transformation, especially progressing changes in economy, significantly affected the construction process. The construction was postponed for two years. Works carried out in this period were concentrated on reducing nuisances for the neighbourhood. Interrupted viaducts' construction caused serious obstacles in road traffic. Construction progress in this period was only 5%. The last, fourth period from the first quarter of 1994 to the third quarter of 1996 was the time of intensive finishing and preparing for operation works. In this period the construction was supported by railway materials manufacturers who provided materials for superstructure construction free of charge.

Works commissioning and putting into preliminary operation took place on 3 September 1996. During the commissioning, the progress of the construction was estimated for 97%. It was agreed that the remaining minor supplementary works won't affect significantly the track operation. Special attention should be given to superstructure works commissioning on the test track loop, for which separate conditions were agreed. Three-level commissioning was set out. The first one, so called preliminary commissioning (ODB-1) was carried out in the superstructure base and on the track after finishing works. The second, transitional commissioning (ODB-2) was performed after 1 Tg load and the third one after 5 Tg.

The main part of the article is devoted to the technical specification of the facility, its operational specification and research possibilities. Particular buildings and equipment were described in details. The basic meaning for research works has got the track system, built as a 7 725 m long loop, consisting of straight sections and curves with 600, 700, 800 and 900 m radii. The maximal length of the straight section equals 1313,90 m. The geometrical layout of the test track loop is depicted and described in charts.

The test track loop is divided into 26 sections, 25 of which are so called track sections, and the remaining one is a switch section. Each track section is 300 m long, and the switch section is 225 m long. The first track equipment consisted of classic UIC 60 rails, partly on timber and concrete sleepers. Particular sleeper types were properly located which resulted that track sections' construction and horizontal location vary. This solution has been having a significant meaning for a various types of superstructure and rolling stock research works. According to this concept a plan of the whole track equipment was developed, taking in consideration different sleepers' constructions (especially concrete ones), different rail fastenings, rail joints and other superstructure elements. Detailed plan of different construction solutions' locations on separates sections of the test track are presented in the figure.

Apart from the track loop the track system includes also station tracks and additional tracks such as reverse curves track with R = 150 m radius, shunting neck and approach track. In the track system there are also 12 switches, a derailer and 4 buffer stops. The track system is presented in the picture and in charts. Part of the station tracks, approach track and shunting neck together with additional objects and installation are so called rail vehicles crash test stand.

In the further part of the article the contact line, signaling equipment, roads and viaducts were described. In the chapter describing operation specification and research possibilities there was stated that forecasted in the eighties the maximal effects of research works carried out on the small loop will be achieved in superstructure durability research and its elements. Then it was an important direction in research works, the test bed of which the smaller loop supposed to be. The rolling stock research effects could be achieved only after construction of the large loop.

The article states that for superstructure research even shorter small loop would be more advantageous, however the accepted track layout, straight and curved sections' length and curves' radii and general track loop length were properly optimized for adaptation not only to superstructure research, but also rolling stock tests. During the design process a possibility of postponing

construction for the future years. For this reason efforts were made to choose the small loop parameters in the way enabling to perform also rolling stock and other equipment tests on in.

In the chapter describing general meaning of the Test Track for the railway research there was emphasized its biggest advantage – it allows to carry out tests of various constructions, devices, railway systems and solutions within one system at the same time. A good example of it is a properly designed research plan, which was presented in the article in a graphic form. For its design particular research were chosen that were thematically related to the works performed in the eighties.

The official opening of the Test Track to operation took place on 12 September 1996. In the article there is presented a list of persons who contributed to execution of the Test Track.

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