
Diploma thesis summary

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Topic: Study on the integration of single track Tram-Train into inner city traffic systems

Thema: Untersuchung zur Einbindung eingleisig geführter Zweisystem-Bahnen in den innerstädtischen Verkehrsraum

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The Darmstadt-Dieburger transport organization DADINA tried a long term traffic concept to relieve the eastern corridor of the city of Darmstadt - to develop Gross-Zimmern - Roßdorf. At present a "combined solution" of regional train, bus and a two-track system is discussed and analyzed. The dual-voltage rail should be within the city along the Landgraf-Georg-Street as eighter single-track trams or two-system rail in two-way traffic to downtown.

In this thesis, the purposes of two-system-trains for urban traffic will be examined first. The dual-voltage trains are used in inner-city areas as a tram on the tram network to BOStrab and the surrounding areas as a regional train on the railway network to EBO. The infrastructures have significant differences, especially on the track system and the power supply. This problem can be solved with two-system trains that can be operated with different power systems. Usually the two-system vehicles with electric drive are equipped with AC / DC or with DC drive combined with diesel generators. This requires so-called system separation points and special signals. Furthermore, the technology and the operation of trams and trains is very different. Railways have an independent roadbed and the trains leave the room distance. Trams run predominantly on sight and mostly dependent on the road. Because of these substantial differences, it will be discussed at the beginning of the work with focus on the legal, technical and operational conditions of both networks.

To enable an economic and trouble-free operation of a two-track system, there are some considerations in advance. This applies to the infrastructure, rolling stock, driving staff and the telecommunications equipment. The operating order is important for the operating conditions. The track can comply with only one operational order, in either the railway - construction and operation (EBO) regulation or the tram - Construction and Operating Regulations (BOStrab).

The registration of vehicles is not only a national, but an international issue. In the past, major difficulties in the approval of two-system vehicles occurred. Therefore the legal bases for the approval of rolling stock and the practical application of such rules are explained as well. The resulting problems in the approval-process will be described below. This is followed by a summary of the requirements on the two-system vehicles.

The available roadspace in urban areas is partly insufficient to lead the railway double track on a special or independent roadbed. Therefore, the purposes of Public Transport Priority and single track paths in urban areas are checked. The examination of the single-track will be discussed on the legal, technical and operational conditions. Examples of the road / rail vehicles, guided single-track will be introduced.

Followed is a brief insight into the recent studies on the optimization of public transport in the eastern corridor of Darmstadt. A documentation of the given facts should show the information about the current situation and the possible problems in the road design. To optimally include the two-system train in the streets, some variants of cross sections are examined at the beginning of the developing an appropriate pipeline route. There are high demands regarding the safety, quality, environment and the economy. Since the urban road space has a narrow width at some places, not all factors can be fully considered. Consequently, some restrictions have to be accepted in the planning, which must be weighed in the subsequent evaluation process. Based on the cross-sections of the pipeline route, different variants are developed and introduced, whereby an alternative is a two-track guided route on Landgraf-Georg-St..

To evaluate the integration of the two-system rail between Ostbahnhof and Castle, a partly formalised rating-procedure is developed. This procedure should be used in the early planning stage, so it can be used for similar problems. The procedure should be transparent and easy to handle and understand. With the help of the rating-procedure, the different line layout variants are compared and rated. In order to obtain a clear and reliable result, a sensitivity control will be made by changing the weight of the individual criteria.

Finally, the introduction of dual-voltage rails is to be retrospectively rated. The possibilities in urban transport and the various route guidances will be introduced. This is followed by optimization possibilities for the launch of a two-system train on the Landgraf-Georg-Street.

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