Status of the Superspeed Transrapid Maglev System - Technological Progress for Future Applications

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Abstract

The first commercial implementation of the Transrapid took place in Shanghai. For future applications the technological progress induced by the Shanghai project before, during and after implementation will be useful and will strengthen the market position of the Superspeed Transrapid Maglev System originally developed in Germany. This process must include all subsystems not only of the so called operating systems but of the guideway as the main part of investment as well. This text concentrates on important components of the operating system.

1 Introduction

After nearly 20 years of functional test and improving all parts of the technical system including the guideway a new era started in 2003: The first commercial implementation of the Transrapid maglev system took place on the link between the new Shanghai airport, Pudong International Airport, and the Shanghai metro line at Longyang Road Station. It is a double-track of around 30 km to be used for circle traffic with 3 vehicles. After a period of less then 3 years of construction and commissioning the commercial use of this project run by the Chinese-owned Shanghai Maglev Transportation Development Co., Ltd., started. Everyone can see and test out this unique traffic system no longer only on the well known test track TVE, but in everyday use in Shanghai.

This first application shows a new appearance of the Transrapid technology. While during the past the focus was only on middle and long distance links we now see, that the technology is as well useful for short-distance applications:

It can be used as an airport-shuttle in Shanghai or planned in Munich for connecting the far-out situated airports with the city centres. Here it can show its phenominous ability of acceleration on short distances and shorten down the long time taking ride between business-places and airports. Of course tourists will take that opportunity as well as business-people. A good chance will be to make check-in for the flight possible on the Transrapid-station in the centre of the town. Therefore the system-operator should work close together with airport-operators and the airlines itself.

But of course the Transrapid system is prepared for future long-distance-use and middle-distance-use as between Shanghai and Hangzhou. People discuss about such use not only in China but as well in northern Europe on the so called “Eurorapid” as a possible part of the Trans European Networks.

2 Examples of Progress for Future Applications

Even as the whole Transrapid Superspeed Maglev System is under continuous observation to recognize necessary adaptations, one can see, that the system in whole is feasible und does not need any changes if the requirements are not changed. In the context of the German government financed development program and in preparation of the Munich project all customer requirements have been

reviewed and some items have been identified which could been improved. Some examples of them are as follows:

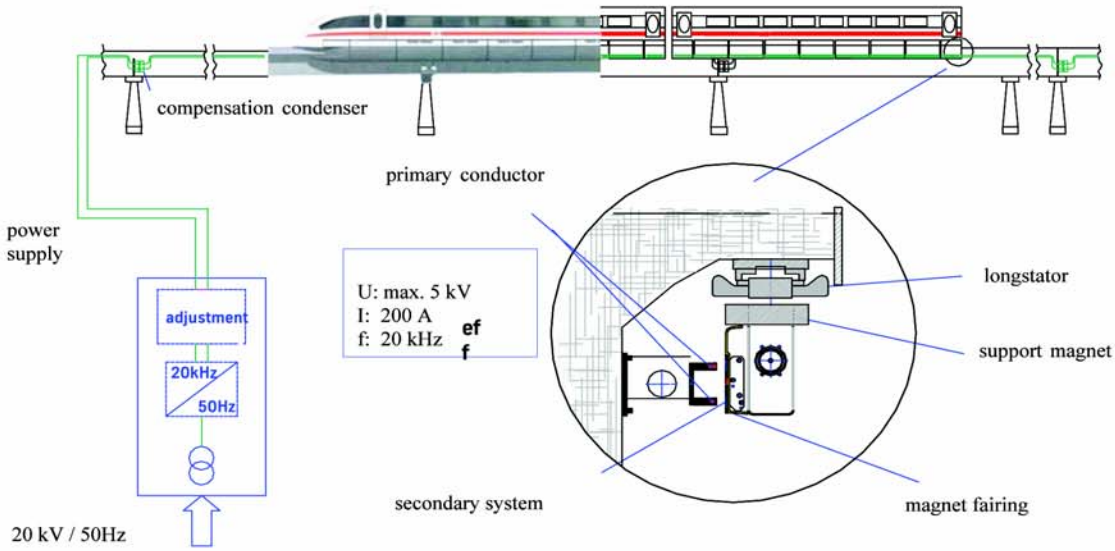
2.1 Vehicles for more passengers and shorter changing times

As the system was originally developed for long distance routes the levitation system was constructed for payload of comfortably seated passengers with normal luggage. Now we see applications where high density seating is combined with high numbers of standees. Such specific requirements demand changes of the vehicle structure as well as of the magnetic system. The process results for example in shortening the nose area and some changes of the inside allocation of the different components. The new nose section of the TR09 with space for luggage containers looks as follows:

By providing room for more passengers on each vehicle (from 222 up to 412) esp. for short distance rides it is possible to reduce the number of sections or even vehicles if the fleet is big enough. By further providing larger doors the changing times for passengers can be shortened, what makes it possible to shorten the complete stop time too. For the passengers the time will be even more comfortable than now as by some actions taken such as new floor structure the inside noise level is reduced.

2.2 Contact-Free Onboard Energy Supply even in Low-Speed Areas

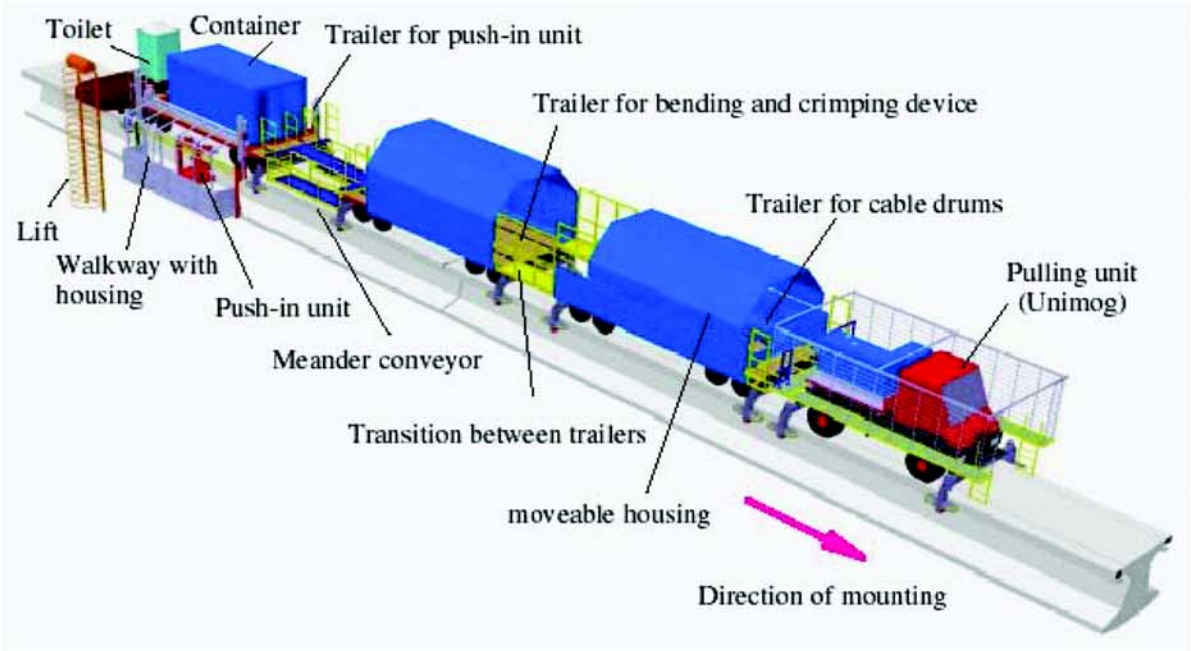
Experiences over the past years showed that it could be an improvement for the whole system if contact-free energy transfer could not only be provided in areas with speed above 100 km/ h but in low-speed areas as well. This could make power rails dispensable as well as the current collector/ pick-up-system. Therefore a CPS/ IPS-System was developed (Contactless Power Supply/ Independent Power Supply), that can work at every speed of the system even when standing.



This concept will make it possible not only to provide energy transfer at all speed independent from weather conditions but as movable parts are reduced maintenance can be reduced as well. It is a system adequate development which is a step towards a new principle of onboard energy. This development has part in reducing inboard and outside noise level.

2.3 Optimization of the Motor Cable Mounting Technology and Grounding System

The longer distances have to be equipped, it is more necessary to shorten the time of mounting the grounding system and the motor cable. While the process was feasible for the Shanghai project it was agreed by all sides that some improvement could be helpful for further projects. Therefore a complete new modular equipment was developed.



This development is going to easy and shorten the process of mounting the systems. As time is costly independently from the place of implementing a project, this is going to contribute it's share in making projects profitable from the beginning.

3 Summary

The Shanghai project made it necessary to think about improving system parameters as well as production technology and assembly und commissioning processes. During the commissioning process in Shanghai the latest findings had to be reflected continuously. Further on customer requirements of the Chinese customer as well as the expected operator of the Munich project, the Deutsche Bahn AG, further developments had and have to take place as well as under the German government financed development program and independent industry programs. The aim was and is to improve the Transrapid Superspeed Maglev system concerning technology but as well to make it even more attractive than it is already regarding investment und operation costs. The system will show that it is the most favourable system concerning lifecycle-cost.

These new developments will help the first commercial implementation of the Transrapid systems having many follow ups in all its possible applications as Airport-Shuttle, maybe Regional Networks and for Medium and Long-distance routes.

The Transrapid Superspeed Maglev System does not need to be changed. But some developments should be implemented to make future projects even more attractive by reducing investment and operating costs. The reduction effects can be seen better the bigger the projects are. The mentioned examples are going to be detailed and complemented by other examples from different subsystems in the detailed working groups.

4 Acknowledgments

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