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Special MV cable for long stator winding application Transrapid Shanghai

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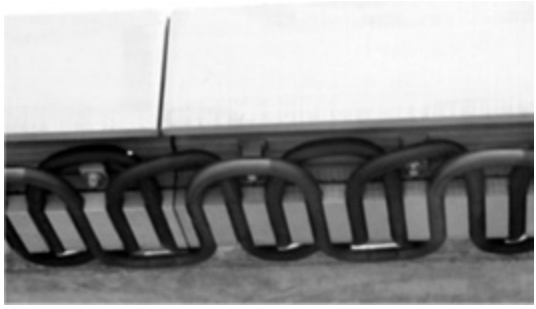
The Shanghai Transrapid project is the first real commercial application of the TRANSRAPID high speed MAGLEV technology. Over a distance of 30 km, the line connects Shanghai's Pudong International Airport with the Long Young Road Station of downtown Shanghai. The basic technical construction data for the Shanghai project were transferred from the TRANSRAPID MAGLEV pilot installation in Lathen/Emsland Germany.

The following article describes the long stator motor winding system used for the TRANSRAPID Shanghai. The MAGLEV technology is based on the principle of a long stator linear motor. In this particular case, the long stator of the linear motor consisting of the stator packs and the 3-phase winding is integrated in the guideway. The train is driven by the levitation magnets acting as linear propulsion rotors in the electromagnetic travelling field of the long stator. The electric system of the guideway is subdivided into motor sections of about 1000 m length each with exactly the one motor section being energized where the Transrapid is just passing.



The initial planning and design stages of the Shanghai project involved considerable effort to make sure that the required short time limit of only 12 months for the realization and the date fixed for the inaugural trip (December 2002) could be met.

Nexans' contribution to the Shanghai project was the long stator winding motor system, comprising

- the manufacture of the long stator winding cable
- supervision of laying and installation work for the three-phase long stator winding motor
- system acceptance tests after laying and installation of the long stator winding cable.

System solutions designed and realized - with a focus on the following developments can be listed as follows:

- Development of the cable design based on appropriate tests and extensive electrical and mechanical research,
- Consideration of the specific laying conditions to be met using a fully automated robot laying technique.
- Development of special production techniques to meet the specific requirements for cabling system and the laying technology.
- Improvement of testing procedures to assess and guarantee system-relevant characteristics, particularly with regard to the long-term behavior.
- The use of jointing sleeve technologies with special regard to a long service life.
- Assurance of all quality characteristics for the laid and installed long stator winding motor system.

For the TRANSRAPID Shanghai project, about 1000 km of cables in individual lengths of up to 3000 m had to be manufactured and laid in the guideway by fully automatic laying robots. The fact that the required high standards, in particular with regard to the installation with fully automated cable laying robots, were fully met, proves that this MAGLEV application will open up a new era in railway technologies.

For the first time, we are able to provide details about a special cable solution, using high quality rubber compounds for conductor insulation and semi-conductive outer sheathing with gliding coating for the long stator winding cable, and to report that the high demands and specifications of the whole system were fulfilled.

All planning and realization stages within the overall framework of the project are described in detail, the difficulties encountered in the process are outlined and full particulars of the engineering solutions are given.