

Basis- and In-service-Inspection of Track and Vehicle Components of the Transrapid

Bernd Rockstroh, Michael Kröning, Gerd Dobmann, Wolfgang Kappes, Friedhelm Walte
Fraunhofer-IZFP, Saarbrücken

Frank Kretzschmar
DGZfP, Dresden

Everybody knows: technical components are designed to reliably guarantee a certain lifetime and the design rules have to consider every possible influence by mechanical static and/or cyclic loading as well as ageing processes like plastic deformation, fatigue, corrosion, thermal influences and their synergies. As far as the Transrapid is concerned it is also clear that practical experiences with ageing of components and infrastructure are not yet available with relevant statistical data coming out of a maintenance strategy supported by non-destructive testing (NDT). Experiences are only based on destructive tests during the design phase.

However, from other introduction of new technologies into service, for instance in nuclear and fossil power generation, it is known that unexpected events can occur, not discussed and simulated during the design phase.

Based on many years of experience in maintenance of components in the power generating or in the airplane industry, it is obvious that non-destructive testing techniques have generally to be designed, optimized, qualified and validated, taking into account the individual properties of the components, i.e. the relevant material properties and the special NDT-technique applied, the geometry influences and accessibility, the development of the population and kind of natural irregularities under fatigue and ageing phenomena and possible realistic artificial defects for reference and sensitivity setting.

Therefore a development of a maintenance concept for servicing the Transrapid is proposed observing routine but reliable NDT-techniques to characterize irregularities in the structure and components. A first step to follow that way is a deep analyzing FMEA (failure mode and effect analysis) of the design rules, CAD-drawings and specifications in order to evaluate the risks of possible failure. This analysis has to take into account the vehicle as well as the concrete structures of the guiding tracks. Furthermore, on-line monitoring of identified ar-

reas/regions of higher failure risk should be a part of the strategy. The paper reports NDT- and monitoring- techniques, sensors available and under development, experiences and lectures learned in comparable applications.