MAINTENANCE OF TUNNELS WITH THE HELP OF SPATIAL INFORMATION SYSTEMS

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ABSTRACT

Tunnels are buildings of high value. To preserve this value and to keep the safety for drivers and passengers maintenance has to be executed. For this maintenance a strategy should be determined. In Germany this is given by DIN 1076. For the runner of a tunnel do the examinations and inspections are left to be done. This leads to a documentation of the results which are of diverse kinds like

– filled out forms
– manual descriptions
– drawn drafts
– raster data like pictures

The results of the inspections are a documentation of discovered damages. They are classified in categories such as

– urgent, immediately to be repaired
– not urgent, but to be repaired in the medium term
– to be watched, to be repaired in the long term.

The classification is of course a balance between the budget of maintenance and the safety.

As the stored data are very heterogeneous it is difficult to select and combine them. The modern techniques of GIS allow to solve these problems. So an information system for supporting the maintenance can be described and created.

The demands on this system are:

– Regular maintenance to be projected into the system
– An integration of data to allow selecting and combining the data
– Tools and support for description and classifying discovered damages
– Fulfilling the task of data integrity
– Total embedding into the workflows of maintenance
– Getting user defined sights of geometric and alphanumeric data

Especially the integration of data is important for comparing damages the whole time with the comparison of different damages in order to find their reasons. This might lead to an improvement of the strategy of maintenance or of the techniques of building tunnels.

Following the demands leads to the usage of modern 3D-GIS-techniques. For this the tunnel and all installed equipment have to be modelled. This means that all objects have to be defined, described and differentiated from others. Additionally attributive descriptions and the graphic geometric layout have to be fixed in detail as well as the connections between the objects. Realizing the model into a information system demands a functional model, which lead to a user shell. Finally a new workflow for the maintenance has to be found in order to get the positive effects of using the system.

Using the system within a workflow of maintenance means using it for controlling the time cycles. Damages have to be modelled as defined objects. So with their attributive information the control of change has to be made. From these data statistics of the development of damages can easily be drawn up. This leads to an estimation of future repairing works, which means that a better planning of the budget is possible.

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BIOGRAPHICAL NOTE

Kehne Gerd, born in 1958, study of Geodesy in Braunschweig & Hannover in 1978-1984. 1989 doctorate (Dr.-Ing.) at the Technical University of Braunschweig with a theses about collecting data of existing buildings aiming to project an information systems for buildings. 1989 – 1994 working at private offices on questions of GIS.. Since 1994 Professor at the Fachhochschule Frankfurt am Main, University of Applied Sciences for the subjects of Geo-Information.
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