

MULTI-LAYERED DATABASE OF BRIDGE INFORMATION FOR NATIONAL ASSET MANAGEMENT OF CIVIL INFRASTRUCTURE

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ABSTRACT : A concept of national asset management provides a framework of maintaining, upgrading, and operating physical assets cost-effectively. In order to implement the national asset management concept in the field of bridge, it is essential to establish a strategy for integration and systematic operation of bridge information. A concept of multi-layered database composed of standardized information layers is proposed for the national asset management of civil infrastructure in this study. The standardized information layers are basically divided by phase of lifetime, and each information layer is composed of reusable data set. The open standards, Standard for the Exchange of Product Model Data (STEP) and Extensible Markup Language (XML), are applied to define data models of the reusable data set. Subsets of STEP-based bridge information model representing physical information such as 3-D shape, material properties, and monitoring information of bridge members are developed for a prototype of multi-layered database. In addition, the Korea Standard of Drawing Information in Construction (KOSDIC) developed on the basis of STEP is also employed to manage the 2-D drawing information of bridge. The XML is employed to develop standardized document models of engineering documents. A topological classification system of bridge components are then presented for interconnection of the distributed data in different information layers. A 3-D bridge information modeling tool is provided as a graphical user interface enabling engineers to manipulate the STEP-based bridge information, and a semi-automated document translator for building of the multi-layered database is developed based on the XML schema matching technique. A prototype of the multi-layered database subjected with existing bridges is constructed by using the developed application modules. Demonstration examples such as automatic generation of a FEA model, data consistency check of the different layers, history management of bridge maintenance and estimation of the lifecycle cost show that the proposed concept can be a basic framework of database for integration and systematic operation of bridge information.

KEYWORDS: Integrated management, Multi-layered database, Bridge information, National asset management, Civil infrastructure, Open standards.

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