Management and Design Software for the Entire Bridge Life Cycle

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Summary

BRIDGEWare® is a suite of state-of-the-art software applications that enable a transportation agency to perform bridge design; bridge load rating; and to manage its bridge inventory, inspection, maintenance and future programming functions by way of a comprehensive Bridge Management System. This paper will discuss the benefits to bridge owners, engineers, bridge inspectors and bridge maintenance and management professionals of a comprehensive, integrated approach provided through a modern software architecture that considers the entire bridge life cycle.

Keywords: bridge; inspection; inventory; maintenance; rehabilitation; software; database; load-rating; superstructure; substructure; design-review

1. Introduction

Through the combined contributions of more than 40 states and the Federal Highway Administration (FHWA), the American Association of State Highway and Transportation Officials (AASHTO) has developed a suite of bridge design, load rating and management software that is widely used by the state and local transportation departments, numerous consultants and international transportation agencies.

Virtis and Opis (bridge load rating and bridge design respectively) and Pontis (bridge management) were developed independently, using two different consultants and management oversight during the early to mid 1990s. In 2001, the products, management teams and development teams worked together to produce BRIDGEWare. These products are maintained and licensed by AASHTO through its cooperative joint software development process.

The BRIDGEWare software features a common database to store nearly every piece of data needed to describe a bridge structure. From this low-level data and generic description of a bridge, the bridge engineer is able to build a structural model for analysis or to analyze inspection and inventory data for future maintenance/rehabilitation needs from a similar user interface. This approach has powerful implications as it enables the user to perform a myriad of activities throughout the bridge life cycle from its design inception though its eventual removal from service at the end of its useful life.

2. The Bridge Life Cycle

From its inception, the development of the BRIDGWare applications focused on two fundamental concepts. First, was creating a business process model or outlining each and every step involved from the design of a bridge through its various inspection, rating and maintenance cycles to its removal from service. The second is creating, preserving and updating a complete data description of a bridge for use throughout the various life cycle processes. Our detailed process flowchart contains more than 100 steps and decision points and is summarize as follows:

1. **Create and store design data** – this involves a complete geometric and material description of a structure in the most fundamental and generic format (Opis product). From this information, finite element models can be built, analyses conducted and designs created and checked to conformance with governing specifications. Quantities and costs may also be