

Expert System for Steel Bridge Superstructure Inspection And Evaluation

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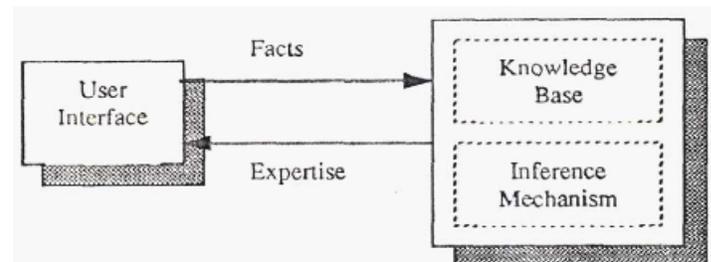
This project involved the design of an expert system to advise bridge inspection teams on fatigue and corrosion of steel bridge superstructures. Steel bridge superstructures were selected since they are the most predominate existing bridge superstructure configuration.

An expert system is one branch of artificial intelligence, which makes extensive use of specialized knowledge to solve problems at the level of the human expert. Expert systems are tools, which are implemented to *assist and consult* experts in solving particular domain problems. In the sense of knowledge engineering, an expert may be considered as a person who has knowledge and special skills that are not known or available to most people. Expert systems are based on the knowledge acquired and used by the human expert to solve the problem at hand.

The expert system development begins with a pre-inspection stage designed to collect data on the superstructure, determine the primary and secondary load paths, and determine the critical details susceptible to fatigue and corrosion vulnerability. This stage results in a suggested course of action for superstructure inspection. The expert system is additionally designed to consult with the inspection team during inspection. Techniques for checking details are suggested and the results of the suggested tests are entered into the system.

The inspection component of the expert system results in a suggested rating for the primary members and the secondary members. The expert system also addresses quality control during inspection.

Basic Concept of Expert System Function



The expert system developed in this project has two parts, one for bridge inspection and one for bridge evaluation. The inspection component provides more focused screening of the conditions and details more likely to develop problems in a given bridge. This is not necessarily expected to make the screening more rapid, but is expected to increase the reliability of the inspection by focusing the inspector's attention on those locations where problems are most likely to occur. The evaluation component provides advice about the causes, seriousness, and follow-up recommendations regarding observed distress. It incorporates "back of the envelope" calculations as required to render these services.

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