US Army Corps of Engineers
Engineer Research and Development Center

Fact Sheet

Construction Engineering Research Laboratory (CERL)
P.O. Box 9005
Champaign, IL 61826-9005

Public Affairs Office
Phone: (217)-352-6511
Fax: (217) 373-7222
http://www.cecer.army.mil

January 2000 (CF-36)

REMR MANAGEMENT SYSTEMS FOR DAM AND LOCK GATES (including Tainter, Miter, Roller, and Sector Gates and Butterfly and Tainter Valves)

The Problem

Over the past 100 years the U.S. Army Corps of Engineers has designed and constructed numerous civil works structures such as locks and dams on the navigable inland waterways and coastal systems as well as dams for power generation. Recently, however, the potential for such undertakings has become limited, and the need for maintenance of the present facilities has become more significant. Many of these structures require, or will require, significant repairs to ensure safe and efficient operations. Those responsible for maintenance and repair (M&R) of these navigation dams and locks need a comprehensive decision support tool to assist them with project prioritization and efficient allocation of scarce funds.

The Technology

To assist managers with M&R planning and budgeting, the U.S. Army Construction Engineering Research Laboratory (CERL) has developed a Repair, Evaluation, Maintenance, and Rehabilitation (REMR) system. This computerized management system is based on standardized inspection and condition rating procedures. It also includes software for handling and storing data, performing required calculations, and producing a variety of reports for work planning and budgeting purposes.

The management system features a 100-point Condition Index (CI) that rates the structure on physical condition and the extent to which it is performing its intended function (see CERL Fact Sheet CF-22, The Condition Index). This is primarily a planning tool with the index values serving as an indicator of the general condition level of the structure. The index is meant to focus management attention on those structures most likely to warrant immediate repair or further evaluation. In addition, the CI values can be used to monitor changes in general condition over time and can assist comparison of the condition of different structures.

Application of this management system begins with an inspection of a gate according to the standard procedure established for the system. CI inspections for gates are performed based on visual observations, dial gauge measurements, and an interview with the primary gate operator(s). This inspection information is entered into the system to compute the CI directly from the inspection records. Several distresses reduce the CI according to at least two considerations: (1) serviceability, or how the structure performs its function on a day-to-day basis, and (2) subjective safety, or how, in the judgment of expert engineers, the safety of the structure has been degraded by various distresses. A combined CI for each gate is calculated by weighting each distress. Structural considerations are flagged on the CI list on

the basis of subjective safety. A structural note is generated on the summary report for the structural subset of distresses as the CI decreases.

Benefits/Savings

This computerized REMR Management System provides procedures for performing condition surveys, consistent and quantitative condition assessment, and data base management. Combined with economic analyses, these procedures allow efficient M&R budget planning through the evaluation of current condition and comparison of various M&R alternatives based on life cycle costs. The ultimate goal is to achieve the best possible condition for dam and lock gates at any funding level.

The collection of consistent, uniform condition assessment data will allow the generation of typical curves reflecting rates of deterioration. The combination of historical condition data and expert opinion allow prediction of changes in the CI based on maintenance history, operating conditions, and applied M&R policies.

Status

The REMR Management System for dam and lock gates has been tested and is being implemented throughout the U.S. Army Corps of Engineers. Training sessions for Corps personnel have been completed and the program will undergo updates and revisions as necessary. Technical Reports, REMR-OM-17 ("*REMR Management Systems - Navigation Structures, Condition Rating Procedures for Tainter Dam and Lock Gates*," Greimann, L., Stecker, J., Nop, M., U.S. Army Corps of Engineers, September 1995), REMR-OM-07 ("*REMR Management Systems - Navigation Structures, Inspection and Rating of Miter Lock Gates*," Greimann, L., Stecker, J., Rens, K., U.S. Army Corps of Engineers, August 1990), REMR-OM-18 ("*REMR Management Systems - Navigation Structures, Condition Rating Procedures for Roller Dam Gates*," Greimann, L., Stecker, J., Kraal, T., Foltz, S., U.S. Army Corps of Engineers, January 1997), REMR-OM-13 ("*REMR Management Systems - Navigation Structures, Condition Rating Procedures for Sector Gates*," Greimann, L., Stecker, J., Rens, K., U.S. Army Corps of Engineers, September 1993), and REMR-OM-14 ("*REMR Management Systems - Navigation Structures, Condition Rating Procedures for Tainter and Butterfly Valves*," Greimann, L., Stecker, J., Veenstra, J., March 1994) have been published to document the procedures used. Funds have not been budgeted for lift gates as of yet; therefore, no REMR Management System exists. The most current REMR software is available on the internet at http://www.cecer.army.mil/fl/remr/remr.html

Point of Contact

CERL POC is Stuart Foltz, COMM 217-373-3487; toll-free 800-USA-CERL; FAX 217-373-6740; email s-foltz@cecer.army.mil; or CERL, ATTN: CECER-CFF, P.O. Box 9005, Champaign, IL 61826-9005.

Visit the CERL homepage at http://www.cecer.army.mil