



US Army Corps  
of Engineers®

Engineer Research and  
Development Center

# Nondestructive Condition Monitoring for Tensioned Steel Members

## Description

The Corps of Engineers maintains many structures that contain embedded and external steel structural members which are under tension. Tainter gates and lock gate diagonal bracing are two examples. Tainter gates are restrained using trunnion bearings held in place by massive steel anchors embedded into the dam itself. Problems known to occur with anchors can lead to loss of anchor tension and consequent severe problems with gate operation. These problems are hidden and difficult to evaluate. Diagonal bracing on lock gates may be subjected to excessive tension due to the repeated opening and closing.



## Issue

Problems with current testing methods include accuracy, length of time required for testing, and access to rods. A non-destructive testing (NDT) method is needed to determine the tension. A method to continually monitor the tension while opening and closing the gates could prevent abrupt failures of rods

## Users

District personnel who need additional information on anchor tension for economic planning purposes or for maintenance and/or operations.

## Products

This technology can be used to make quantitative measurements of tension in steel tainter gate anchor rods. The instrument will rapidly measure tension in the field and, with post-processing, will provide evaluation of fitness for service. It will be small, portable and will work in areas with limited access.

## Benefits

This research has created a method that directly interrogates the mechanical and material properties of the steel structural members, addresses the corrosion problem, takes little time and human resources to perform, and requires minimal access.



## Corps Program

Navigation Systems Research Program, Mr. James Clausner, Program Manger.

## Point of Contact

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