



# Polymeric Slides to Replace Rollers on Hydraulic Gates and Valves

## Problem

Gates on hydraulic structures are used to regulate the flow of water, be it a gate on a dam or a valve in the locks. In the past, steel rollers or wheels were commonly used on lift gates and valves to assist in the movement of these components. Over time these rollers are prone to seizing up due to corrosion that occurs in the damp environment associated with navigation structures. When this happens, raising and/or lowering the gates or valves becomes difficult and negatively impacts normal operations. Replacement steel rollers can cost millions of dollars, not including installation. Replacing the steel rollers with polymer blocks to act as slides was considered to be a simple and inexpensive fix.



Mechanically Fastened UHMWPE

## Approach

This research effort is focused on the use of ultra-high molecular weight polyethylene (UHMWPE) blocks that function as slides on lift gates and valves to replace steel rollers that are prone to seizing up in a typical lock and dam operating environment. As a field test, UHMWPE slides were mechanically fastened on a lift gate at Bankhead Dam in Alabama. Initially the slides functioned as intended, and then the gate started seizing up. Upon removal of the gate, it was determined that the embedded, corroded steel in the reaction wall was damaging the slide and increasing its coefficient of friction. A friction test was designed and multiple materials were tested. Testing results showed that the best combination of materials would be Belzona SuperGlide and either UHMWPE or Teflon (PTFE). The repair method was then modified to smooth out the embedded, corroded steel with a Belzona metal repair compound topcoated with Belzona SuperGlide. **A new method to adhesively apply the UHMWPE was used on a second gate. This method proved to be faster and more cost effective than mechanical fasteners. Due to the success of this second method, Mobile District is planning on retrofitting all lift gates at Bankhead Dam with the adhesively applied UHMWPE and imbedded steel repair. Further studies at Portland District are assessing the ability to use these materials on gates with higher hydraulic loadings than those at Bankhead Dam.**



Embedded, Corroded Steel

## Products

The primary product will be engineer guidance to design, use, and install UHMWPE materials as a slide system to replace rollers or wheels on gates and valves used on navigation structures. This guidance is expected to be made available through the Inland Navigation Design Center. The overall investigation and field demonstration will also be described in a series of technical transfer products, including conference proceedings, technical reports, articles in publications such as Navigation e-News, and webinars.



Friction Testing of UHMWPE on SuperGlide

## Benefits

Implementing polymeric slides as replacements for rollers or wheels on gates and valves is significant because initial costs for the replacement are about two magnitudes less than currently used replacements. Also, the new materials offer increased service life and reduced future maintenance costs.

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