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OCH

Overhead Crane & Hoist

Historic crane upgrade

Ergonomics

Case study

The Midwest

Dam fine job

Two firms teamed up for the upgrade of historic cranes at the Bagnell Dam in the picturesque Lake of the Ozarks region, Missouri

Located about three-and-a-half hours southwest of St. Louis, the Bagnell Dam was built over a two-year period between 1929 and 1930 by Union Electric Light & Power Company (now known as AmerenUE). When completed, it formed the beautiful area known as the Lake of the Ozarks region, Missouri.

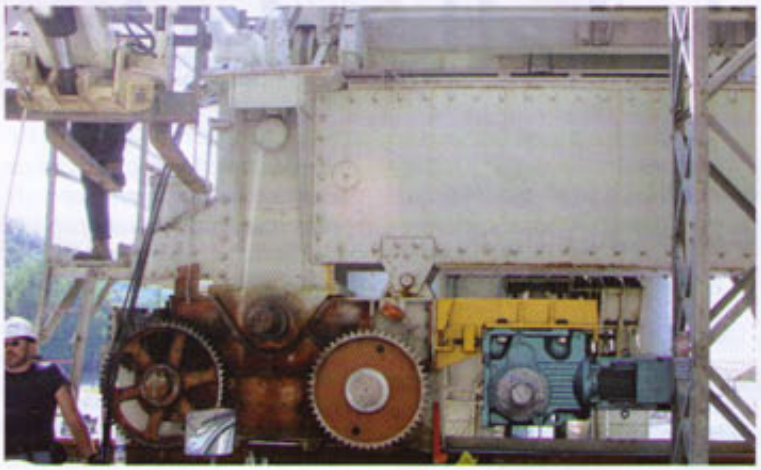
As part of the original plant equipment, Whiting Corporation was contracted to supply all of the plant's overhead gantry cranes. These cranes, including two 70t capacity head gate cranes, as well as the 150t capacity power house crane, are primarily used to perform maintenance and removal/replacement of major plant equipment.

The two head gate cranes service 24 spill gates that assist in controlling lake levels. Periodically, each of these gates must be raised for various maintenance activities. Although the crane controls were still in excellent condition, upon review of the new and more stringent Federal Emergency Management Agency (FEMA) requirements under the National Dam Safety Program, AmerenUE elected to upgrade the existing controls. In August 2007, Whiting Corporation was favored with the contract for this work, with Whiting Services, Inc. and Power Electronics International, Inc. performing on site work and project management.

Right: The power house crane in the foreground, and the houses for the two gate cranes above

A key FEMA requirement of the new control system specified precise torque limiting capability of the hoist motion to help prevent damage to any of the spill gates as they are raised. These gates can remain in place for some time and it is not uncommon for them to "stick" in place. Therefore, uncontrolled lifting torque during hoisting can (and had at another hydro plant) literally snap the gate pivot bearing and distort the gate structure.

Another key FEMA requirement called for an onboard, propane-supplied,



Part of the truck assembly for one of the gate cranes

A 1931 picture of the power house crane

40kW back-up generator capable of transferring power to either head gate crane in the event of loss of plant power. Installing the generator in the crane's control room was no small task. The plant and cranes are registered with the Historical Landmarks Society, which meant removing and replacing two large sections of original casement style windows to place the unit out of sight so that the appearance of the cranes was not altered.

To meet these control requirements, Whiting Services selected Power Electronics International, Inc. (PE) as its supplier for the new motor and control system. The hoist motions were converted to PE's Micro-Speed Multi-Vector drives and the bridge and trolley motions employed Micro-Speed open loop drives. Together, these drives provided infinitely variable speed and lifting control of the load while also achieving all of the torque limiting requirements to meet the plant's expectations.

Other safety and control system upgrades included: radio/cab modes that allow either single or dual motion functions; an anemometer (wind gage) alarm system; anti-collision, hard-wired festoons; various safety status lights and horns; ground level emergency stop stations; cab lighting and heating; and new 1,000 watt metal halide area lights for night time work activities.

Because of the success of the head gate crane upgrade, in June 2008 Whiting and Power Electronics International, Inc. were awarded with a contract to perform a similar upgrade to the 150t power house crane. This upgrade also included an engineering study to allow for an engineered lift of approximately 160t to replace a turbine assembly.

Whiting Corporation and Whiting Services were able to review the original circa 1930s engineering drawings and calculations to provide viable, effective, long-term solutions. Other enhancements included: eliminating the original single motor bridge drive with over 80 feet of line shafts; bevel reducers; and support bearings in favour of compact, twin drive motor reducers located at the wheels. These enhancements increase the effective life of the bronze bushings and shafts to further reduce long-term maintenance costs. OCH

Above: A 2008 picture of the power house crane