

PUTZMEISTER TELEBELTS® AND BOOM PUMP HELP PLACE MORE THAN THREE MILLION CUBIC YARDS OF CONCRETE FOR DAM REBUILD

In the early hours of December 14, 2005, high atop Proffit Mountain in the Missouri Ozarks, a triangular section on the northwest side of the Taum Sauk Dam Upper Reservoir failed, discharging one billion gallons of water in just twelve minutes. The failure sent a 20-foot (6m) crest of water down the Black River.

Not only was the Upper Reservoir itself destroyed but areas neighboring the reservoirs also felt the wrath of the breach, including dense forests, which were ultimately washed away. Fortunately, no deaths occurred in the destruction, and very few injuries were reported.

AmerenUE's Taum Sauk Plant was built in 1963 as a "pumped-storage" hydroelectric plant, storing water from the Black River in the Upper Reservoir and then releasing it to generate electricity when power was needed. The Upper Reservoir and hydroelectric

plant are connected via a 7,000-foot (2,100m) tunnel which carries the water from the Black River to the Upper Reservoir.

In late winter 2007 AmerenUE started the rebuild of the dam's 189,486,001 cubic-foot (5,365,646m³) Upper Reservoir which requires three million cubic yards (2,280,000m³) of concrete to be placed. Putzmeister's brand new Telebelt® TB 600 along with a Putzmeister TB 130 and 47Z-Meter truck-mounted concrete boom pump are on-site to help convey and place the impressive amount of concrete.

AmerenUE is a subsidiary of St. Louis-based Ameren Corporation, serving 2.3 million electric customers and 900,000 natural gas customers in a 64,000 square-mile (165,759 km²) area of Missouri and Illinois.

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Image rendering courtesy of AmerenUE. Image rendering of what the Taum Sauk Dam Upper Reservoir will look like once rebuild is complete.

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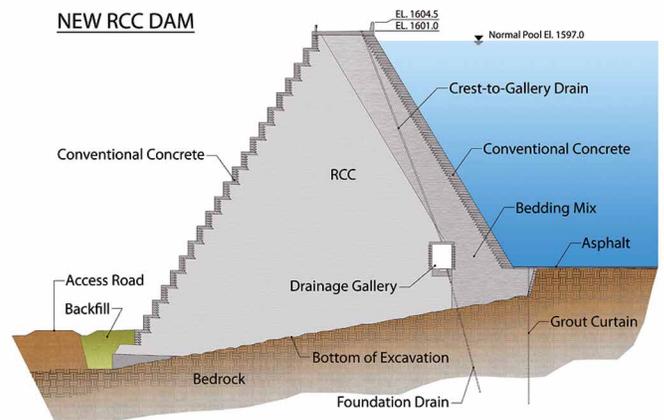


Image rendering courtesy of AmerenUE. Image rendering shows the rigorous design for Taum Sauk Dam's Upper Reservoir.

Picking Teams

Ironton, Missouri-based Ozark Constructors, LLC (Ozark), a joint venture of Pueblo West, Colorado-based ASI Constructors, Inc. (ASI) and St. Louis-based Fred Weber, Inc. (Fred Weber), were selected by AmerenUE as the team to rebuild Taum Sauk Dam's Upper Reservoir.

Paul Rizzo Associates, Inc. (Rizzo), based out of Pittsburgh, Pennsylvania, was chosen as the Engineer of Record for the project and project manager for the rebuild.

"We are confident that the combination of ASI's knowledge and skill in dam construction, combined with Fred Weber's mining, aggregate processing and heavy civil construction expertise, is the perfect project team to successfully reconstruct the Taum Sauk Upper Reservoir Dam," says Thomas R. Voss, AmerenUE president and CEO. "AmerenUE would not consider returning this plant to service if company officials were not absolutely certain that the new design met, or exceeded, all safety criteria required by the Federal Energy Regulatory Commission (FERC). After much analysis, we are now confident that this plant can be returned to service and operated safely to restore a critical source of reliable power to our customers."

Why Roller-Compacted Concrete?

The rebuild calls for more than three million cubic yards (2,280,000m³) of concrete, of which 2.7 million cubic yards (2,000,000m³) is roller-compacted concrete (RCC) and will be used for the core of the dam.

"In order to comply with FERC rulings and working with Rizzo, AmerenUE has determined that the safest and most economical method of rebuilding the Upper Reservoir would be to use an RCC design," comments Craig Giesmann, managing supervisor of hydro engineering for AmerenUE. "This design employs the latest in overflow structures, monitor and control systems, seismic design criteria and other safety features."

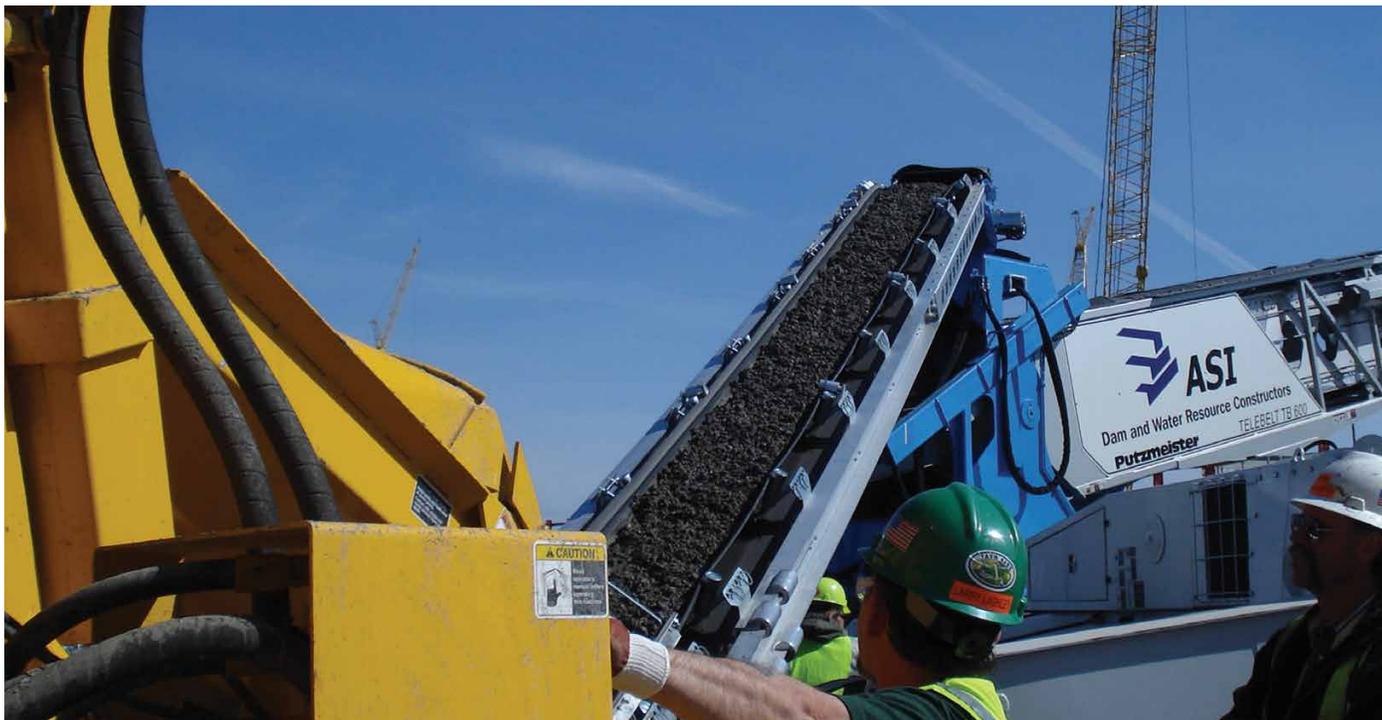
"Extensive testing was conducted prior to the start of the rebuild using the actual RCC mix components planned for the Taum Sauk Plant," comments Giesmann. "Rizzo is conducting tests and inspections throughout the rebuild to ensure the concrete mixes are consistently at the highest quality possible."

"In addition, the dam is designed to accommodate the most recent seismic design criteria and to withstand potential ground shaking from both near-field and far-field earthquake events up to a 2,500-year return period."

Quality control testing of the concrete utilized in the project will ensure that design specifications are achieved in all cases.

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“The Putzmeister TB 600 is designed to convey the harsh, zero-slump RCC mix. There’s no other way to convey a zero-slump RCC mix; you can’t pump it but we can convey it with a Telebelt,” comments Lee Schermerhorn, vice president of ASI and part of Ozark.

The dam is being built in nine sections, according to David Hall, project engineer for Ozark, which are being referred to as “Monolith #1,” “Monolith #2,” “Monolith #3,” “Monolith #4,” “Monolith #5,” “Monolith #6,” “Monolith #7,” “Monolith #8” and “Monolith #9.”

Although the majority of the dam will be RCC, according to Lee Schermerhorn, vice president of ASI and part of Ozark, the outer linings of the dam and various sections of the dam foundation, about 300,000 cubic yards (228,000m³), are made up of conventional concrete.

The conventional concrete is used for the dam lining, according to Giesmann, to provide a water barrier for the reservoir. In addition, according to Hall, the conventional concrete is also used to fill in holes in the natural rock of the foundation.

“Each monolith is 600 feet (182m) long and will reach 100 feet (30m) above the reservoir floor,” adds Hall. “We start with the bare rock and begin building up from there with our equipment.”

Hall says that after the rock holes are filled with conventional concrete, RCC is placed on top of that for the core of the dam in each Monolith.

Currently, Monolith #1 and #2 are being placed with the RCC mix and the foundation is being placed for Monolith #3, according to Hall.

On-Site Batching

Because the Taum Sauk Dam Upper Reservoir project required such a large amount of concrete, it was in Ozark’s best interest to have on-site batch plants, according to Schermerhorn. Four batch plants are on-site; three that hold the RCC mix and one that holds the conventional concrete mix.

“All four batch plants are running at the same time,” Schermerhorn says. “About 10,000 – 12,000 cubic yards (7,600 – 9,120m³) of concrete per day is generated by all four of the plants. The conventional batch plant mixes at 300 cubic yards (228m³) per hour. The three RCC mix batch plants mix at three different rates; 250, 450 and 650 cubic yards (190, 342 and 494m³) per hour.”

Getting from Point A to Point B

According to Schermerhorn, one of the biggest challenges on this project is getting the concrete where it needs to go.

“The devil is really in the details,” notes Schermerhorn, “when it comes to delivering and placing the concrete from point A to point B with our equipment. The combination of the Upper Reservoir soaring 800 feet (244m) above the hydroelectric plant (a greater

head than the Hoover Dam) and pumping and placing concrete into the 2.6 million square feet (241,540m²) of formwork in the Upper Reservoir (including both upstream and downstream), makes the terrain challenging to maneuver.

“To master the tricky job site, we’ve created a reliable method of delivering and placing concrete which requires our machines to work together, to ensure the concrete gets to where it needs to go.”

Integral to this material delivery system are three powerful pieces of Putzmeister America, Inc. equipment: the new Telebelt TB 600 telescopic belt conveyor, a TB 130 and a 47Z-Meter truck-mounted concrete boom pump.

“The Telebelts convey and place the concrete into either loading trucks, or into hoppers of other large-scale conveyors on-site,” comments Schermerhorn. “If loaded into a truck, the concrete is carried to where the large-scale conveyors are located. These machines then place the concrete where needed.”

According to Schermerhorn, the TB 600 and TB 130 place both the RCC and conventional concrete, while the 47Z-Meter places only the conventional concrete. Ozark has already placed more than 150,000 cubic yards (114,000m³) total of RCC and conventional concrete

combined for the Taum Sauk Dam Upper Reservoir rebuild.

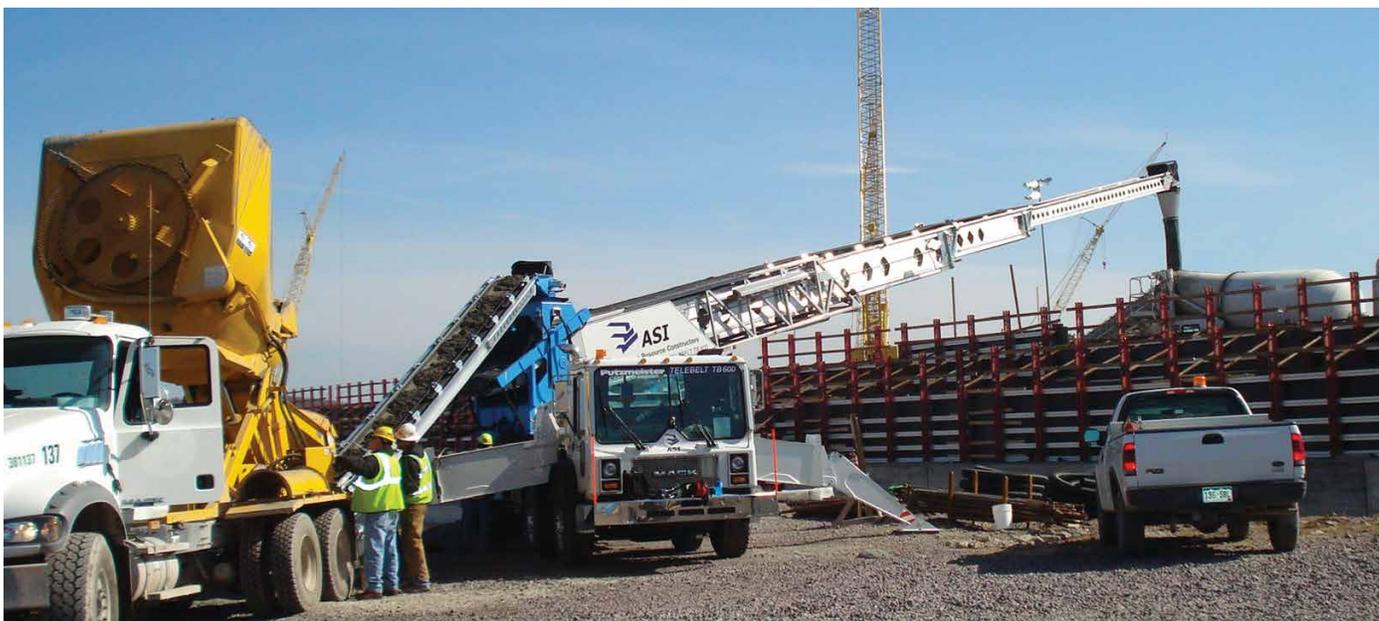
Debuted by Putzmeister America at ConExpo-CON/AGG 2008, the TB 600 is on its first project. Schermerhorn says, “The 24-inch (610mm) width of the high capacity main conveyor and feeder belts on the TB 600 is perfect for volume-intensive projects like the Taum Sauk Dam Upper Reservoir. The width absolutely provides the versatility this job needs.

“The TB 600 is designed to convey the harsh, zero-slump RCC mix,” notes Schermerhorn. “There’s no other way to convey a zero-slump RCC mix; you can’t pump it but we can convey it with a Telebelt.”

The TB 600 can also place materials from liquid to six-inch (152mm) aggregate. “The TB 600 features a rated output of 600 cubic yards per hour (459m³/hr), which is an invaluable benefit for the project because of the massive amount of concrete we’re placing and the multiple locations the machine is moved to on a daily basis,” says Schermerhorn. “If we need to get one section of concrete conveyed in a small amount of time, the TB 600 is able to do it with complete ease.

“Moving both Telebelts to multiple locations throughout the day

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is practically effortless. Simple teardown and quick setup is what Telebelts are known for. The side panels of the standard folding hopper quickly fold into the feed conveyor and end panels connect with linchpins. The Telebelts’ on-site efficiency is just incredible.”

The TB 600’s horizontal reach of 102’ (31.08m) and the TB 130’s horizontal reach of 126’ 6” (38.56m) are a huge plus as well, according to Schermerhorn, especially accessing the difficult to reach areas in the Upper Reservoir to the loading trucks and conveyors.

According to Lee Arquette of Putzmeister Midwest Repair & Service Center (Midwest), in order for ASI’s TB 130 to better convey and place the RCC mix, Midwest enhanced some of the structural elements and component configurations on ASI’s TB 130 at its Milwaukee facilities per ASI’s request.

“We made a number of modifications to ASI’s TB 130 to get it ready for the Taum Sauk Dam Upper Reservoir project,” notes Arquette. “We widened the exposed width of the main belt between the skirts, moved components or made special components to open transfer areas, enlarged some transfer components which also received special processes and treatments. Some of these enhancements merited incorporation into new TB 130s currently in production, and were definitely taken into consideration when the new Putzmeister TB 600 was designed.

“The TB 130 can convey and place a variety of materials up to four-inch (100mm) aggregate.

In addition to the Telebelts, Schermerhorn says their Putzmeister

47Z-Meter truck-mounted concrete boom pump is also assisting in helping to place the more than three million cubic yards (2,280,000m²) of concrete for the rebuild.

“Our 47Z-Meter is placing concrete in a method similar to our Telebelts; into loading trucks or the large-scale conveyors,” says Schermerhorn. “In addition, the 47Z has also helped to pump and place the conventional concrete needed to fill in the holes in the natural rock of the foundation for all of the Monoliths. Congested projects like this one are no match for the 47Z. With its compact outrigger footprint, its 151’ 3” (46.10m) vertical reach and its 138’ 1” (42.09m) horizontal reach, it overcomes day-to-day obstacles on-site to help us get the concrete exactly where it’s needed.

“The versatile five-section Z-Fold boom configuration on the 47Z handles space restrictive areas and can pump even if the boom is not fully extended. It makes our operator’s life so much easier,” adds Schermerhorn.

The 47Z-Meter boom pump can pump and place concrete up to 260 cubic yards per hour (200m³/hr).

Schermerhorn says that, “without the TB 600, TB 130 and 47Z-Meter boom pump, this job would have been almost impossible.”

Ozark and its equipment will be on-site through late 2009, when the Taum Sauk Dam Upper Reservoir is slated for completion.

A PROJECT NOT TO FORGET: “THE FACT THAT OUR COMPANY SPECIALIZES EXCLUSIVELY IN THE CONSTRUCTION AND REHABILITATION OF DAMS, SPILLWAYS, AND MAJOR WATER RESOURCE PROJECTS MAKES OUR INVOLVEMENT IN THIS MONUMENTAL PROJECT AN UNFORGETTABLE MILESTONE IN OUR HISTORY,” REMARKS SCHERMERHORN.

Specs

Owner/Developer:

AmerenUE – St. Louis, MO

Designer/Engineer:

Paul Rizzo Associates, Inc. – Pittsburgh, PA

General Contractor:

Ozark Constructors, LLC, a joint venture of Fred Weber, Inc. (St. Louis, MO) and ASI Constructors, Inc. (Pueblo West, CO) – Ironton, MO

Equipment

One Putzmeister Telebelt TB 600, one Putzmeister Telebelt TB 130 telescopic belt conveyor, one Putzmeister 47Z-Meter truck-mounted boom pump.

Ozark's Putzmeister 47Z-Meter truck-mounted concrete boom pump is pumping and placing the conventional concrete needed to fill in the holes in the natural rock of the foundation for sections of the dam, referred to as “Monoliths”.

