

# Concrete Cutting Techniques

## Electrify TVA Authorities



To compete with other suppliers of electricity, the Tennessee Valley Authority (TVA) has in recent years cut operating costs by nearly \$800 million a year, reduced its workforce by more than half, increased the generating capacity of its plants, stopped building nuclear plants and developed a plan to meet the energy needs of the Tennessee Valley through the year 2020.

In 1998, the TVA unveiled a new clean-air strategy to reduce the pollutants causing ozone depletion and smog. The initiative was to cut annual nitrogen-oxide emissions from TVA's coal-fired plants by about 170,000 tons a year. Day & Zimmermann, a full-service plant maintenance contractor, managed all the outage work and new construction for the TVA in various plants including the Cumberland City Fossil Plant, a plant built in the 1970's.

At the Cumberland City Fossil Plant, Day & Zimmermann was responsible for installing selective catalytic reduction systems (SCRs), structures that were to reduce the amount of nitrogen iodine entering the air. The SCR project involved the removal of the old preceptors and the erection of new 200-foot-tall SCR catalysts. To accomplish this, the existing concrete footers, floors and elevated slabs had to be removed and a new, heavily-reinforced



Top: The TVA Cumberland City Fossil Plant was built in the 1970s and required renovations to reduce emissions. Left: Wire sawing was a critical factor on the TVA job, especially when removing large sections of concrete. Wire sawing was much faster cutting, reducing cutting time by one-third.

concrete foundation had to be installed. The renovation at this location will be completed in two phases over a three-year period. Renovation started in March 2001 with the projected on-line dates of 2003 for Unit #1 and 2004 for Unit #2.

Day & Zimmermann contracted True-Line Coring and Cutting of Tennessee, Nashville, a branch of The Coring and Cutting Group, to perform the removal work which included most every type of concrete cutting — flat sawing, wire sawing, wall sawing and core drilling. In addition to the removal phase of this project, True-Line also had to drill holes for new pipe penetrations in the concrete walls and drill dowel holes to hold the steel reinforcing rods for the newly-poured concrete floors.

Each site for the new SCR systems was located in a pit where various concrete slabs, footers and floors needed to be removed. Most of the job included cutting out 2-foot-thick walls without any overcutting, cutting away the concrete from existing foundations that involved cutting up to a depth of

4 feet, and drilling several holes ranging in size from 2 to 4 feet deep. It also involved the under-pinning of two concrete foundations.

Because of the structure's age, the specific lengths and depths of concrete to be cut were unknown. In addition, the structural makeup of the concrete changed continually so it was almost impossible to follow a consistent step-by-step process to complete the cuts. These constraints required continuous changes in the application for removal.

A typical scenario involved switching from one sawing application to another mid-cut. For example, to remove a concrete footing, operators set up the track for a wall saw to begin their cut. As they began to cut, they realized the concrete was much thicker than anticipated so they decided that a wire saw was better suited to make the cut. In addition, where no over-cutting was permitted, a wire saw was a better tool to use. The wire saw was much faster, reducing their cutting time by one-third.

In setting up to wire saw to cut the concrete pillars, operators also encountered problems. The 30- to 48-inch pillars did not consist of pure concrete throughout their entire thickness. True-Line had to drill a straight 6-inch diameter hole through which to thread the wire, but the numerous voids (sections of mud or dirt) made drilling a difficult task. Pre-existing steel columns needed to be reinforced with steel plates as extra weight was added to the original structure.

Wire saws used included a Hydrostress SB with an RDS2 Power Pack that was used in longer pulls, a Diamond Products WS25 and a Longyear 360 Conversion that was used in smaller pulls. Operators used a 40-hp electric flat saw when cutting the floor inside the plant. For wall sawing, operators used a Longyear wall saw and

a Diamond Products Hydrostress FZ Wall Saw with an RDS2 Power Pack and a 72-inch blade. This Hydrostress saw also featured a remote control.

Because the cut concrete was in a confined area, Brokk demolition equipment was used to break and excavate the concrete.

Once the old concrete was removed, for the new steel structures to be anchored, True-Line operators had to core drill 20 2-inch-diameter holes through 12 to 14 feet of solid rock for the new reinforcement. They also cored 100 1.5 to 2.5-inch-diameter holes 6 feet deep where new concrete would be poured to support the SCR structures. Core drilling was completed with a Cushion Cut Hydraulic HCD Core Drill.

True-Line had many constraints on this job. In addition to standard sawing safety precautions, True-Line took extra measures to ensure safety on the site. Since the plant was built next to the Cumberland River and the area was experiencing unusually heavy rains, the under-drain system in the basement of the facility would constantly fill with water. This water combined with the water produced during sawing was constantly pumped out of the trenches where operators were working to maintain a safe work area. Fall protection harnesses were always worn when required. Operators also taped off their work areas with caution tape and kept a close eye on the heavy traffic through the area so no one was injured. The workers also had to be careful not to be hit by the Bobcats as they came into and out of the area to pick up and remove concrete.

Concrete cutting was specified for this project because it was the fastest and most precise way to remove the concrete. Thick walls could not be overcut and the contractor wanted complete isolation cuts on the footers to maintain the

structural integrity of the plant. This plant was a "live unit," generating power to millions of TVA customers, so it could not be shut down during the renovation. Day & Zimmermann set deadlines for each part of the concrete removal process to ensure that the construction of the SCRs could be accomplished as quickly as possible. "True-Line operators never missed a deadline," said Brad Workman, Civil Technical Support for Day & Zimmermann.

Although slurry containment was not a major issue on this project, True-Line left a clean work area upon completing their job. They finished the project on time and within budget, drilling about 375 feet of concrete, wire sawing 1,700 cubic feet of concrete and cutting a total of 600,000 pounds of concrete using various concrete cutting tools and methods.

Carl Jones, Safety Director of The Coring and Cutting Group, credits the timely work to the operators selected for the job. "They had a willingness to do whatever was necessary to meet the customers' needs," Jones said. "It was a very successful job for us and our contractor."

*True-Line Coring and Cutting is a CSDA member with offices in Nashville, Knoxville and Chattanooga, Tennessee. Their services include slab sawing, wire sawing, wall sawing, core drilling and grinding, and they also perform confined-space remote-controlled breaking and excavating. They have CSDA certified operators on staff. True-Line is part of The Coring and Cutting Group, which has 13 locations throughout the Midwest and Southeastern U.S. ●*

**Resources:**

**General Contractor:**  
 Day & Zimmermann NPS, Inc.  
**Sawing and Drilling Contractor:**  
 True-Line Coring and Cutting,  
 The Coring and Cutting Group  
**Method Used:** Wall Sawing, Wire Sawing,  
 Core Drilling and Flat Sawing  
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