TIVAR® 88-2 Eight Million Tons Later
AEP Glen Lyn Power Plant Railcar Receiving Hopper
Case History

APPALACHIAN POWER COMPANY / GLEN LYN PLANT

The Glen Lyn plant is located just a few miles from the West Virginia/Virginia border approximately 20 miles east of Princeton, WV. The 90 year old facility has two units that generate 340 MW of electricity and burn about 700,000 tons of coal per year.

FUEL AND RECEIVING HOPPER

The coal received at the Glen facility is bituminous with an average particle size of 2" minus. It is mined in southwest Virginia and southern West Virginia. The coal is characterized as having low sulfur content (below 1 %); particle sizes that range from 2" to very fine; moisture content between 4% and 9%; and bulk density of 55 pounds per cubic foot.

All of the coal arrives by train in 100-ton bottom dump railcars. These railcars unload into a single pyramidal shaped in-ground bunker that measures approximately 21' x 17' at the top and has a 6' x 3' 6" discharge outlet. The vertical height of the hopper is approximately 8' 6". The angles of the sloping walls are 45° and 48° respectively which make the valley angles less than 35°. The A36 carbon steel hopper is designed to discharge at 700 tons per hour with an annual throughput of 700,000 tons.

PROBLEM

Through years of service the A36 substrate in the railcar receiving hopper was worn and corroded in many spots and by 1997 the hopper had a rough uneven surface. Additionally, coal bound for the Glen Lyn Plant was often delayed, sitting in railcars for weeks. Depending on the season, the loaded coal would be subjected to significant precipitation. If the coal was of a fine gradation it would absorb large quantities of moisture making flow chacteristics extremely poor. Once in the receiving hopper the saturated coal would not fall through the collection bunker across the steel plate to the belt system below. The coal would stick and hang-up on the interior surfaces of the hopper. Operators were required to frequently rod the coal with 40 pound steel bars to regain flow. In addition to poor flow, the coal was also prone to freeze in the hopper during periods of cold weather. When the conditions were at the worst (cold rainy weather) the demand for power was usually the greatest. These problems caused delays in unloading railcars and required additional labor with men working well into the frigid nights to maintain adequate coal flow to the plant's belt system and main coal bunkers.

SOLUTION

The materials handling group at AEP's corporate office, located in Columbus, Ohio, contacted the SystemTIVAR® Engineering Group at Quadrant EPP (previously Poly Hi Solidur) to determine if a TIVAR® liner could solve the flow problems in the receiving hopper at the Glen Lyn plant. The materials handling group at AEP had previous successes with TIVAR® products and services (notably at the Rockport plant in Indiana) and hoped to solve the flow issues at Glen Lyn with a TIVAR® liner.

The SystemTIVAR® Engineering group visited the plant and witnessed the coal adhering to the corners and the hopper walls after the railcars emptied into the bunker. Their engineers determined the necessary coefficient of friction that would be required to enable the coal to discharge properly. Based on the type of coal and the volume that flowed through the hopper, they were also able to determine the wear properties necessary for a polymer liner.

Using the information collected, a TIVAR® 88-2 liner was determined to be the solution to the receiving hopper's flow problem. TIVAR® 88-2 is an industrial grade of polymer that features unique characteristics including a very low coefficient of friction, excellent wear properties and rugged impact strength. TIVAR® 88-2 exhibits a lower surface coefficient of friction than 304-2B stainless steel and is chemically inert.

The SystemTIVAR® Engineering team designed 5/8" thick TIVAR® 88-2 oversized panels that would be attached in a "drape-hung" method at the top of the hopper using mechanical fasteners. The corners were score-cut to enable the liner to bend into the corners and form radius clean-out plates.

This design rounded off the existing square corners and facilitated smooth, fast coal flow in the shallow valley angles. T-profiles were incorporated to permit the oversized panels to expand and contact freely, eliminating any possibility of the liner buckling due to expansion. To complete the installation, a stainless steel leading edge protector was welded above the liner. The leading edge protector prevents the coal from migrating behind the liner and the T-profiles that are located on the center hopper walls. The TIVAR® 88-2 liner system was installed in October 1997.

CONCLUSION

During the past 12 ½ years over eight (8) million tons of coal have passed through the Glen Lyn railcar receiving hopper. During this time the TIVAR® 88-2 liner performed above all expectations. Operators are no longer required to rod the coal to facilitate discharge resulting in no lost time injuries due to "punching coal" at the bunker. The freezing of the coal to the substrate was completely eliminated. The two units were never curtailed during this time due to lack of coal coming from the receiving hopper.

Time has now come for the replacement of the TIVAR® 88-2 liner. While still functioning well, areas around the discharge are worn. Due to the success of the liner, AEP has opted to have the SystemTIVAR® Engineering Group install a new TIVAR 88-2 liner. The liner system will be installed in May 2010 and is ready for another eight million tons.