NEW YORK POWER AUTHORITY NEEDED AN INNOVATIVE RESOLUTION TO A CHALLENGING REPAIR PROBLEM; TRI TOOL DELIVERED A UNIQUE MACHINING AND WELDING SOLUTION.
New York Power Authority (NYPA), one of the country’s largest state public power organizations, challenged Tri Tool with machining and welding a 50” metal shaft sleeve that had premature wear, horizontal grooving and cycle fatigue cracking at their Blenheim-Gilboa (B-G) Pumped-Storage Hydroelectric Power Plant. The shaft is located at the base of Brown Mountain at subterranean depths making repairs tricky.

NYPA’s primary LEM Contractor stated that they would have to remove the entire 55 ton shaft in order to replace the shaft sleeve, thereby incurring a costly replacement program.

Larry Spiro, Senior Mechanical Engineer, NYPA had successfully worked with Tri Tool in the past and called to find out if Tri Tool had a solution to their challenge.

NYPA's pumped-storage hydroelectric power plant generates over 1,160 megawatts of electricity. At times of peak demand, water from B-G’s upper reservoir plunges 1,200 feet through a 28-foot diameter vertical shaft within Brown Mountain to drive the four pump-turbine generator motors. Above each pump-turbine is a shaft sleeve, surrounded by a seal, or “packing box”, all of which controls the leakage flow rate. The shafts and corresponding seals must provide high wear resistance to the abrasive contaminants in the reservoir water. It was found that during the Life Extension & Modernization (LEM) project, a more abrasive Resin material was used, and this combined with reduced shaft sleeve hardness and extreme particulate (silt) velocities, created excessive wear in the seal area of the new shaft sleeves. It was determined that all four pump-turbine units would need to be replaced or repaired. Not only was cost a concern, but the tight confines around the shaft and the toxic build-up of argon gases during welding posed a real health risk to the mechanics.
Using predominately “off the shelf” equipment, Tri Tool’s engineers worked closely with the staff at NYPA to design the perfect solution. The resulting design included a custom 655SB clamshell lathe, an OD turning tool module and the AdaptARC® mechanized welding system. Tri Tool manufactured the complete system, and then “mocked” up a metal sleeve and trained B-G’s mechanics on the hydraulic clamshell and orbital welding tools. After extensive training with Tri Tool, Blenheim-Gilboa scheduled a September outage for the unit showing the most wear.

First, the 655SB clamshell, known for its ability to perform within tight clearances and tolerances, was used to machine out the degraded area using the OD turning tool module, on the steel shaft down to .300”. Next, the mechanized AdaptARC welding system was mounted to the clamshell and performed a multi-layer GTAW deposition/cladding overlay. Due to the tight confines and the safety of the mechanics, work was performed utilizing a remote camera where they could control the quality of the welds. The welded area was then machined to ensure an acceptable surface finish and precision seal within a tolerance of no more than a .002” at a 63RMS, restoring it to original specifications.

I was very impressed with Tri Tool’s design group customizing a tool for our unique application and the excellent customer support service they provided when the work was taking place. The project came off exactly as it was planned and I totally thank the Tri Tool staff with all their knowledge, cooperation and professionalism that was provided. They are truly a wonderful company to work with and I would recommend them to any other company with a similar or unique application.

Lawrence M Spiro, P.E.
Senior Mechanical Engineer
• Portable Precision Machine Tools
• Mechanized Welding Systems
• Pipeline Equipment • Code Welding
• On-Site Construction Services
• Special Engineering & Custom Mfg.
  • Equipment Rentals