

Repair and Strengthening of Penstock Pipe/Tunnel System of a Hydroelectric Power Plant



Turkey
2012



PROJECT BRIEF



A run-of-the-river hydroelectric power plant was built in 2011 in Trabzon –a city on the Black Sea coast of north-eastern Turkey. The penstock pipe/tunnel system that carries the water from the intake to the turbine is normally under significant water pressure ranging from a couple of bars to 37 bars. The reinforced concrete tunnel of this system (2.3km length) -with a cross section area of around 9m² - developed significant cracks along the hoop and longitudinal directions due to the pressures ranging between 4-15 bars. The concrete lining has also been degraded in some segments and Tekstar – the certified applicator of Tyfo® Fibrwrap® Systems in Turkey- was contacted to find a repair and strengthening solution.

Following detailed design stages and Fyfe's recommendations, the structural cracks were first repaired by epoxy resins injections and cavities between tunnel lining and rock mass were stabilized by polyurethane / silicate resins and then Tyfo® SCH-41 Composite System was used to wrap the inside of the cracked tunnel segments. The Tyfo® Composite System served as an external reinforcement and provided resistance in both hoop & longitudinal direction preventing future cracks. A couple of months after the application a proof test started where a water pressure at 37 bars was sustained at the turbine for 4 months test period. The Tyfo® application made the tunnel fully functional. Following the proof test there was also a walk-through check in the tunnel and no deterioration was observed.

