Job Report

Delivery of Suspension Bridge for belt conveyor reconstruction.

TMSA
Bulk Handling Technology

PROJECT SCOPE

In 2015, two sections of a VALE long-distance belt conveyor were destroyed due to the Fundão Dam break. The episode interrupted the only iron ore transport route between the Fabrica Nova Mine and the Timbopeba Plant, both in Minas Gerais, compromising production at the Mariana Complex.

In the weeks following the event, VALE began the search for alternatives to rebuild the damaged structures and, thus, resume operations. The company needed an innovative and safe solution that would allow the rebuilding of the conveyor in the shortest possible time and cost, taking into account local and operational constraints.

As an aggravating factor, one of the damaged stretches had an extension of approximately 450 meters, with 300 meters of erosion. For this reason, none of the solutions commonly applied as a structure for belt conveyors met the project.

The solution chosen to circumvent the problem and allow for the reconstruction of the stretch was the development of a suspension bridge, a project that was coordinated by TMSA, in partnership with COWI.

SOLUTION PROVIDED

Considering legal access restrictions and safety risks of more mud slides from the dam, TMSA, in partnership with COWI, developed a Suspension Bridge that met the operational requirements of a belt conveyor, especially in relation to horizontal displacements maximums.

The Suspension Bridge was designed with a headroom of 302.4 meters and a deck (slab) 4 meters wide to support a belt conveyor with a design capacity of 3,600 t/h and 4.2 m/s, with a walkway in both sides. The project also had two towers (North and South) 30 meters high, which were connected to two cables with a diameter of 50 mm each.

Two main cables, in turn, were connected to a deck by means of 32 windstays cables, with 19 mm to 30 mm in diameter, spaced apart from each other.

It is worth noting that the deck's ground supports had particular features, being articulated and sliding, giving the necessary degree of freedom to the bridge's displacements, especially during the transient loading and unloading regime.

At the highest point, the suspension bridge built was 60 meters above the ground. The 302.4 meter span characterized the solution as the 2nd longest span suspension bridge in Brazil, second only to the Hercílio Luz Bridge in Florianópolis.

"TMSA was responsible for the entire civil design, mechanical and structural engineering, supply of solutions and assembly supervision for the suspension bridge. In partnership with COWI, we set up a cohesive group, which sought the best possible result for the operation, through a commercially attractive technical solution that respected environmental restrictions".

Rui Manuel de Franca e Camara, engineering manager.

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