

CASE

Alliance between TMSA, VALE and COWI results in an innovative project for belt conveyor reconstruction.

CUSTOMER PROBLEM

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

In the weeks following the event, VALE began the search for alternatives to rebuild the damaged structures and, thus, resume operations.

SOLUTION PROPOSED BY TMSA

To get the operation return to work, TMSA developed an innovative and safe solution, which allowed the conveyor to be reconstructed in the shortest possible time and cost, considering the local and operational restrictions.

One of the sections, in particular, had an extension of approximately 450 meters, being 300 meters of erosion. For this reason, none of the solutions commonly applied as a structure for belt conveyors met the project.

Considering the legal access restrictions and safety risks of more mudslides from the dam, TMSA, in partnership with COWI, proposed the development of a suspension bridge that would meet the operational requirements of a belt conveyor, especially in relation to maximum horizontal displacements.

The suspension bridge was designed with a 302.4 meter free span and a 4 meter wide deck (slab) to support a 3,600 t/h design capacity and 4.2 m/s belt conveyor, with a walkway in both sides. The project also had two towers (North and South) with a height of 30 meters, which were connected to two

cables each 50 mm in diameter.

The 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.

RESULTS ACHIEVED

Considered one of the key companies for the success of the work, TMSA was responsible for the entire civil project, mechanical and structural engineering, supply of solutions and supervision of the suspension bridge assembly.

“In partnership with COWI, we set up a cohesive group, which sought the best possible result for the operation. The freedom and trust that VALE placed in us were fundamental for us to seek the best technical alternative, including with regard to environmental impact, and one that would be commercially attractive”, highlights Rui Manuel de Franca e Camara, engineering manager at TMSA.

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.

Due to the proposed solution, VALE's long-distance belt conveyor returned to full capacity in 2018. Therewith, the Mariana Complex Operations were fully re-established.



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