SIKA AT WORK

INTAKE REPAIR WORKS AT ITUANGO DAM, DCN, COLOMBIA

OFFSHORE & MARINE CONSTRUCTION
CONVENTIONAL ENERGY

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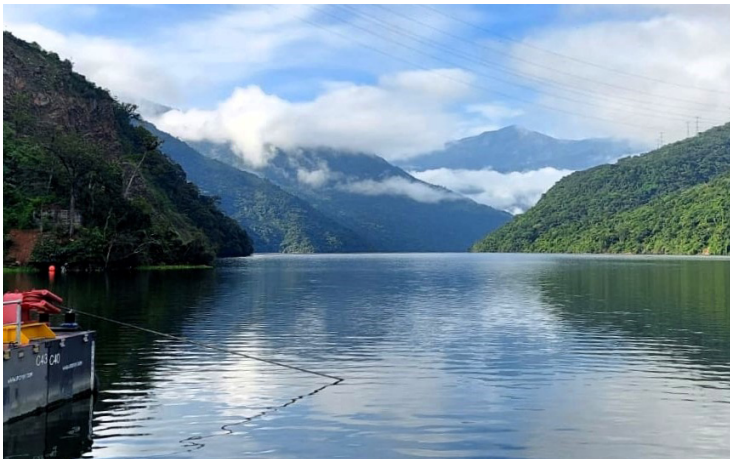

PROJECT DESCRIPTION

The Ituango hydroelectric project is Columbias largest hydropower project harnessing the power of the Cauca River to generate electricity for the country. It has an installed capacity of 2.5 GW and produces about 13,900 GW-hours of electricity per year.

In 2018 the project was exposed to a series of events that threatened the safety and stability of the infrastructure of the Dam and the surrounding communities. The crisis began when two of the four diversion tunnels, that were supposed to allow the water to flow through the dam were, blocked with concrete as part of the construction process.

Project name:	Intake Repair Works at Ituango Dam, DCN
Location:	Ituango Dam, Antioquia, Colombia
Year:	2023 (Phase I) and 2024 (Phase II)
Application:	Repair and maintenance
Product:	SikaGrout®-9550
Amount:	195 MT
Typical water depth:	60m

PROJECT REQUIREMENTS

Sika was contracted to provide engineering, supply of ultra high performance cementitious (UHPC) grout and application services for the installation of four steel plugs required for dewatering and repair of the intake tunnels. The UHPC materials were deployed in the annulus between the steel plug and the inside of the intake concrete walls to secure the steel plug.

SIKA SOLUTIONS

The deployment of the grout took take place from a barge situated 70 meters above the intake location. The UHPC grout was delivered through 2" hoses running from the barge to the plug location. The placement of the grout was complicated due to the geometries and as the structural design requires a high degree of filling of the annulus, it was proposed to carry out Computation Fluid Dynamics (CFD) modelling to evaluate the proposed method for placing the wet UHPC material in the annuli between the steel plug and the intake concrete walls.

The CFD modelling simulated the flow of the wet UHPC in the delivery lines as well as it simulated the flow in the annulus between the steel plug and the intake walls. A two-phase flow model simulated the wet UHPC grout delivered through the hose arrangement and how the wet grout displaced the reservoir water in the annulus through the proposed inlets to ensure a complete filling of the annuli. Quantities including pressure, velocity and fluid densities in the wet UHPC were studied as part of the CFD work. A high resolution of those parameters in space (geometry) and time allowed us to fully understand how the wet UHPC displaces the lake water in the annuli and the pressure introduced to the delivery system.

Sika Offshore uses the COMSOL Multiphysics software for CFD and FE simulations of the wet and hardened behavior of the SikaGrout® products, respectively.

CUSTOMER BENEFITS

- The highly flowable grout allowed for precise placement through long hoses and a successful underwater deployment.
- CFD modeling ensured that the annulus was completely filled.
- A slow-pump operation and staged grouting process minimized risks and ensured uniform grout distribution.
- The grouting process was completed within a week, allowing for fast dewatering and the timely start of repair work.

PROJECT PARTICIPANTS

Main contractor:	DCN Diving B.V.

SIKA SERVICES AG
Tueffenwies 16
CH-8048 Zurich
Switzerland

Contact
Phone +41 58 436 40 40
www.sika.com

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