

Strand Anchors with Sensors Secure Grancarevo Dam



PRODUCTS

*DYWIDAG Permanent
Strand Anchors with
double corrosion
protection*

*DYNA Force@ Sensors
Hollow-Piston CFRP
Cylinders*

UNIT

*DYWIDAG-Systems
International GmbH,
Austria*

LOCATION

Bosnia and Herzegovina

TIMELINE

2007-11-30

SCOPE

Production

Supply

Technical support

Supervision

The Grancarevo Dam has a height of 123m, and so is the country's highest dam. Recently, the monitoring systems for the safety of the dam were rehabilitated and modernized.

Context

The Grancarevo Dam is located on the Trebišnjica River in the southeast of Bosnia and Herzegovina near its border with Montenegro and went into operation in 1967. The two hydroelectric power plants, Trebinje-1 and -2, with a total output of 188MW were completed in 1968 and 1979.



Solution

In order to ensure the long-term stability of the dam, permanent Type 12-0.62" DYWIDAG Double Corrosion Protected (DCP) Strand Anchors were installed in the right flank of the slope directly underneath the arch dam.



The anchors used were electrically testable EI-Iso Strand Anchors in lengths of up to 61.5m. This system has been approved for permanent use (applications with a 100+ year design life).

By electrically uncoupling the anchor head and the tendon from the anchor plate, a resistance test between the anchor and the soil can be carried out – the integrity of the corrosion protection sheathing can be tested at any point of time in the future by the use of standardized resistance tests. Furthermore, the EI-Iso System complies with SIA requirements.

In order to allow the owner to continuously monitor the prestressing forces

in the strand anchors, 46 DYNA Force® Sensors were installed in the bond length of 23 anchors. The DYNA Force® Sensors also provided an additional mechanism for monitoring the forces during tensioning. Additionally, DYWIDAG supplied 4 multiplexers with a stainless steel casing for permanent outdoor use that were connected to the DYNA® Force® Sensors in the anchors. Furthermore, DYWIDAG engineers installed a readout unit and a controller to automatically read the data.

The data measured by the DYNA Force® Sensors are continuously read and saved by a controller that is connected to the readout unit. The data is transferred via a glass fiber connection with the controller to a computer located in the control room and analyzed once a month. The control room serves for the centralized monitoring of the complete dam.

The strand anchors supplied by DYWIDAG were tensioned using two coupled Hollow-Piston CFRP Cylinders. For additional protection, greased stainless steel caps were installed over the anchor heads.

Thanks to the type EI-Iso Strand Anchors that were used, the slope underneath the Grancarevo Dam will be permanently monitored to help ensure the safety and reliability of the acting forces.