

UMA OYA HYDROPOWER COMPLEX

Two-Component Grouting



The Uma Oya Multipurpose Development Project is an irrigation and hydroelectric complex in Sri Lanka. It includes the construction of dams to channel 145,000,000 m³ of water per annum over several tunnels and a 15,290 m headrace tunnel to the Uma Oya Power Station.

Location

Uva Province, Sri Lanka

Client

Ministry of Power and Renewable Energy

Contractor

Farab Co., Iran

Field of application

Post excavation grouting

Products used

3 units of IC650/7255-2C, inline

Volume mixed/pumped

Approx. 20 m³ per day

Delivery of plant

October 2017

Sales contact

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Background

The Uma Oya Hydropower Complex (UP-MDP), located in the highlands of Sri Lanka, is an irrigation and hydroelectric complex currently under construction in the Badulla District. The complex involves building a dam across Dalgolla Oya and channeling water over a 3,975 m tunnel to Mathatilla Oya. Another dam is constructed at Mathatilla Oya to channel 145,000,000 m³ of water per annum via a 15,290 m headrace tunnel to the Uma Oya Power Station, where water is then discharged via a 3,335 m tailrace tunnel to the Alikota Aru. The groundwater table is close to the surface, which led to severe water ingress during tunnel driving. Special high-pressure injections were used to minimize water ingress. To prevent the inflow of water in the future, the surrounding rock is being grouted with a cement suspension to seal it. These measures will also allow the groundwater level to recover.*

The challenge

An unexpectedly high water ingress during tunnel driving of up to 2,000 l/min and pressures of up to 40 bar (September 2018) required a high-pressure injection system. Due to the high water flow, there was a danger that the injected cement suspension would be washed out and the planned sealing measure would therefore be ineffective. Due to the partially fractured geology, there was also the risk that a large amount of cement suspension would have to be pumped in order to achieve the desired sealing effect.

* Source: Wikipedia Uma Oya Hydropower Complex



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Our solution

To seal the surrounding rock mass, a compact mixing and injection system with dosing pump was proposed. Based on the required mixing capacity and injection pressure, an IC650/725-2C Häny plant consisting of a high-performance mixer HCM300, an agitator HRW350, and an injection pump ZMP725 with coupled dosing pump was put forward as a solution.

This plant allows the necessary amount of accelerator to be mixed and injected under high pressure depending on the delivery rate of the cement suspension. The Häny high shear mixer HCM300 enables the mixing of a cement slurry with a water-cement ratio of down to 0.5. The Häny double piston pump ZMP725 allows the grout to be injected with a pressure of up to 100 bar. A registration unit shows and records flow and pressure, and can also switch off the grout pump when a pre-set volume and/or pressure is reached.

Reliable systems and services from Häny

Due to the necessary injection pressures of 30–70 bar and the required dosing pump for the setting accelerator, the customer opted for 3 Häny IC650/725-C injection plant units.

As space on the TBM was limited, the high shear mixer and agitator were mounted one behind the other on a separate frame. The powerful hydraulic system, which drives both the injection pump (plunger type) and the dosing pump, was mounted on a second frame, which was installed by the customer on a low-profile railway car. The system also has a data logging system which records both the pressure and the flow rate and stops the pump when the pre-set injection pressure is reached. The recorded data can be read out via the USB interface and easily transferred to the office for further evaluation. To familiarize the customer as quickly as possible with the operation of the systems and the rather special use of a setting accelerator, Häny service engineers conducted several training sessions on site in Sri Lanka. In this context, the need for spare parts was also discussed, taking into account local requirements and accessibility.

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