LISIE

CLEANING OF THE SAINT-MARTIN-DE-LA-PORTE INTAKE THROUGH THE SIPHON TUNNEL

PROJECT TITLE
Siphon Tunnel of Saint-Martin-de-la-Porte Intake

CLIENT
EDF (Électricité de France)

LOCATION
Saint-Martin-de-la-Porte (73), France

YEAR OPERATION
2021

PROJECT OVERVIEW

The Saint-Martin-de-La-Porte intake diverts a large part of the Arc River flow to feed the Arc–Isère hydropower scheme. The Arc Valley runs through nappes of marly and calcareous-schistose thrust sheets, whose highly erosive nature causes significant sediment transport in the river, leading to noticeable siltation in the various cascade hydropower facilities.

The operation entrusted to Watertracks by EDF pursued two main objectives:

- Dredging of the cofferdam guide rails and the sill of the left-bank sluice gate of the Saint-Martin-de La-Porte dam, by pumping sand and gravel accumulated immediately upstream of the diversion dam. This first phase aimed to ensure the possibility of installing cofferdams.
- Dredging immediately downstream of the intake trashracks, by accessing the submerged siphon tunnel through an existing hatch located about one hundred meters downstream of the dam. This second operation was intended to restore the hydraulic functionality of the structures by eliminating the head loss generated by sediment accumulation behind the intake trashracks.

In both cases, the operations had to be carried out without draining the reservoir, in order to avoid any production losses for the operator and to minimize ecological impact. The dredged materials were to be resuspended and discharged toward the central sluiceway, thereby restoring a natural sediment flow.

TECHNICAL APPROACH & IMPLEMENTATION

To meet the project requirements, Watertracks specifically developed the LISIE robot. LISIE was deployed by crane onto the reservoir bed, at a depth of 6m, to clean the left-bank sluice gate of the Saint-Martin-de-La-Porte dam over a width of 10m. This dredging of sand and gravel made it possible to clear the guide rails and sill for cofferdam installation.

The approach consisted of suctioning the materials using the dredging cutter mounted at the end of the arm of this underwater excavator and discharging them toward the dam's central sluiceway.

The LISIE robot was also used to dredge the section located immediately downstream of the diversion intake of the Arc River, on the dam's right bank. Access to this dredging area was achieved by moving LISIE through the siphon tunnel connecting the headrace canal to the Saint-Jean-de-Maurienne powerhouse. The robot entered via a Jeep-gauge access hatch and advanced upstream inside the flooded tunnel for a distance of 100m to reach the sediment deposits to be removed.

A 3D reconstruction of the facility was carried out during the project preparation phase to help operators find their bearings and guide the robot "blind" in front of the dam and inside the tunnel. The robot's position was estimated based on its absolute heading and forward speed. Operators regularly corrected this positioning by measuring distances to distinctive points using the onboard sonar.

This solution was designed to operate efficiently while meeting the site's access, safety, and environmental constraints, ensuring both technical effectiveness and minimal disruption to dam operations.

"It was the size of the Jeep access hatch to the tunnel that constrained the sizing of the LISIE robot."

RESULTS & PERFORMANCE

- **Underwater dredging** carried out in a highly confined environment and under structural works.
- **Transformation** of an industrial challenge into a sustainable operational solution.
- **Zero** accidents.

WATERTRACKS