



## Mavuzi and Chicamba hydroelectric power plants rehabilitation

### MISSIONS:

Complete rehabilitation of Mavuzi and Chicamba HPP's for Electricidade de Mozambique (EDM), EPC contract under FIDIC silver book

### FUNDINGS:

SIDA – Swedish International Development Agency(33,3%)  
AFD – French development bank (49,1%)  
KFW – German Bank for Development (17,6%)

**TOTAL AMOUNT OF CONTRACT:** 90 Millions €

**HYDROKARST SHARE:** 40 Millions €

**CONTRACT DURATION:** 3 ½ year

**CONSORTIUM:** Rainpower & Cegelec (Vinci Group)

### WORKS DESCRIPTION

Penstocks refurbishment

Gates refurbishment

Civil works: Turbine foundations and embedded parts

Publics works: Road construction, earth embankement

Housing: Refurbishment and construction of site houses

Underground works: Desanding and rehabilitation of tunnel

Logistics : Life camp construction

Mozambique 

Hometown : Maputo  
Language : Portugais





## Sites presentation



### CHICAMBA

- Double-arch and double-curvature dam
- 2 penstocks: **Length : 70 lm, diameter: 3500 mm**
- Power plant with 2 Francis unit, 24 MW each
- 4 spillway gates: **Dimensions : 9,600 x 2,540 m**
- 5 spillway stop logs: **Dimensions : 9,720 x 2,000 m**
- 2 draft tube stop logs: **Dimensions : 6,935 x 1,850 m**
- 2 intake gates: **Dimensions : 6,655 x 3,910 m**
- 2 intake trash rakes



### MAVUZI

- Arch bridge dam
- 12 spillway gates: **Dimensions : 16,260 x 2,657 m**
- 3 bottom outlet : **Dimensions : 6,280 x 1,995 m**
- 2 intake gates: **Dimensions : 4,205 x 3,890 m**
- 5 desanding valves
- 1 tunnel intake's channel : **Length : 2000 m**
- 3 penstocks : **Length : 600 ml , Diameters 1500 mm and 1850 mm**
- Power plant with 5 Francis units, 2 of 5 MW and 3 of 13.3 MW



## Hydromechanics : Penstocks

Penstock replacement



Inside and outside coating



Foundation refurbishment and prestressed wire replacement



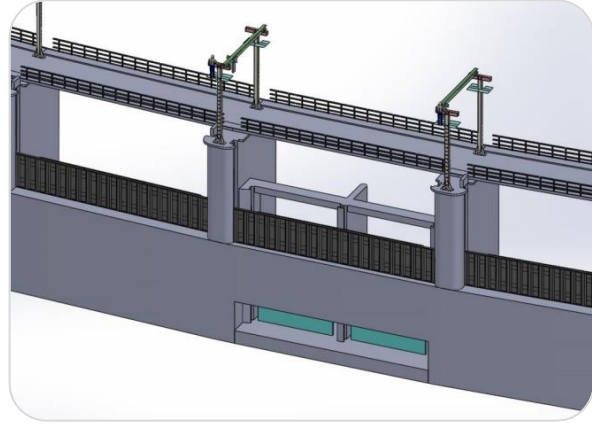


## Hydromechanics : Gate refurbishment



**Step 1 : Gantry crane manufacturing and installation to remove gates from embedded parts**

The use of a mobile crane was not possible due to the dam crown capacity



**Step 2 : Gates and motorization removal, by using temporary gantry crane**



*Spillway gates removal with temporary gantry crane*



*On site gates storage*

**Step 3: Gates rehabilitation, due to extrem corrosion, majors parts of the gates had to be replaced**

### Main steps of gate rehabilitation

- Pre-blasting
- Thickness measurement
- Streghtening parts replacement
- NDT testing
- Blasting
- Coating
- Seals replacement



*Welding on gate*



## Hydromechanics : Gate refurbishment

### Step 4: Motorization refurbishment

- Cleaning
- Disorder inspection
- Blasting and coating
- Cells, brakes and motorization parts replacement
- On site re-assembling



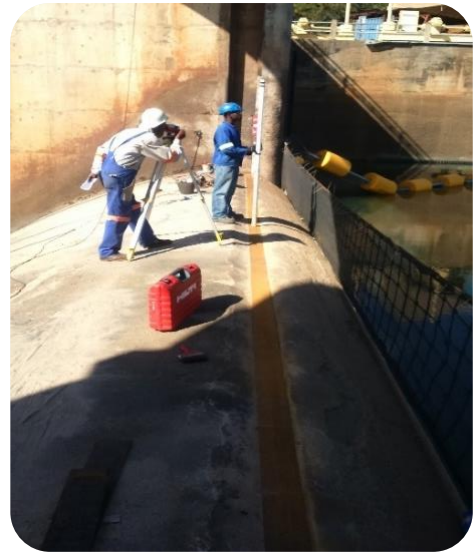
*Motorization shafts and bearings assembling*

### Step 5: Embedded parts refurbishment

- Inspection
- Civil works refurbishment
- Blasting, coating
- Thickness measurement of coating



*Bottom outlet embedded parts refurbishment on Mavuzi*



*Installation control of spillway embedded parts*

### Step 6: Commissioning

Once the refurbishment of gates and motorization is completed and after the connection of new electric boxes, we proceed to the installation of equipment.

Gate operation and sealing is controlled during commissioning



*Refurbished gate installation*



*Refurbished motorization and electric box*



## Civil works: Unit foundations

### Demolition and reconstruction

Mavuzi HPP has 5 Francis units with a total capacity of 2 x 5 MW and 3 x 13.3 MW.

Within the frame of unit 1 and 2 replacement, Hydrokarst carried out civil works which consisted in demolition of old concrete structure around units et rebuild foundation structure to install now spiral casing and generators

Hydrokarst achieved design, works and quality control.

The efforts to consider for the design were 10.027 kN vertical and 1 200 kN horizontal at the beginning of spiral casing.



*Apron demolition*



*Reinforcement installation*



*Hydrodemolition*



*Views of the new foundation*



## Public works

### Roads

Hydrokarst rehabilitated 12.7 km of road on Mavuzi's site and 2.4 km of road on Chicamba's site. These roads enable a direct link between the two sites



*Culverts rehabilitation*



*Road sub-layer levelling*



*Bridge under construction*

### Earth embankment construction

In order to dry the bottom outlets 2 and 3 area, Hydrokarst build an earth embankment to control the river flow during the rehabilitation of Mavuzi's gates





## Construction works

### Housing rehabilitation

To enable to the technicians to live near HPP's, 6 houses on Mavuzi site and 2 houses on Chicamba site had been refurbished.

### New housing construction

Construction of 3 new houses on Chicamba site and 5 houses on Mavuzi site



### Mavuzi and Chicamba power stations refurbishment

- Inside and outside painting
- Chicamba roof cleaning
- Mavuzi roof replacement
- Improvement and installation of guards and ladders
- Chicamba storage room rehabilitation
- Chicamba control room refurbishment and insulation
- Mavuzi control room refurbishment
- Sanitation systems rehabilitation on both power stations



*Painting on Chicamba facade*





## Rope access works

### Rock fall protection around both HPP's

Chicamba :

- 36 sqm of wire net
- 142 lm of anchoring Ø25 mm
- Rock scaling
- Concrete foundation construction

Mavuzi :

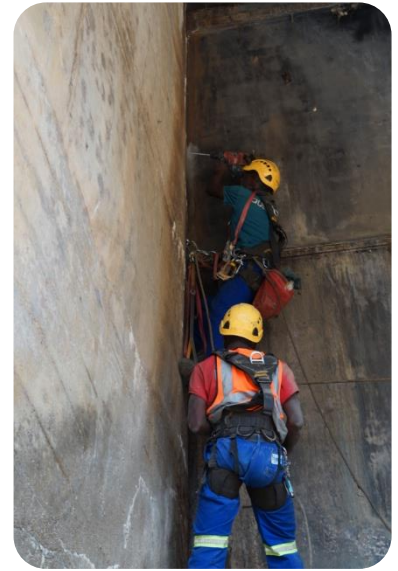
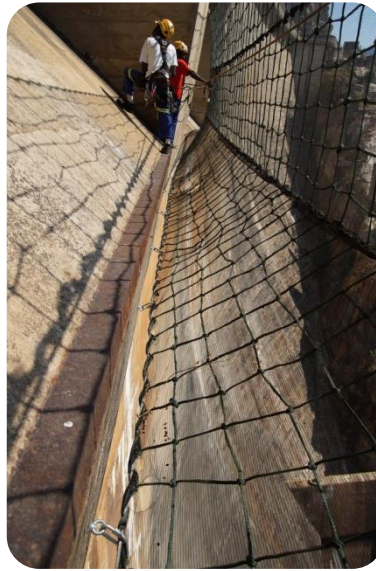
- 26 000 sqm of netting
- 36 sqm of wire net
- 726 lm of anchoring Ø25 mm
- Rock scaling



### Securing work access points

Implementation of :

- Safety net
- Scaffolding
- Safety life line

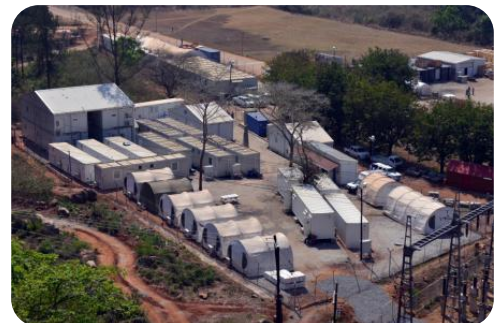


## Logistics

### Life camp construction

Each camps are suitable for 100 workers, fully equipped with offices, workshop, sanitation, kitchen, nursery, laundry, resting rooms and sport gym.

During the duration of the contract, Hydrokarst was responsible for camp's maintenance, safety and catering.



Life camp



Water treatment station



## Social actions



- New fountain installation in Mavuzi's village
- Oven construction at the Mavuzi's orphanage
- Material supply for the construction of a school in Mavuzi
- Access ramp construction at Chimoio's orphanage



## Training

- Coating application
- Welding and Mechanic
- Rope access works
- Safety management
- Bureau Veritas certificate for scaffolding installation



**BUREAU  
VERITAS**