Politecnico di Torino

Dams & Reservoirs DAY 2025

Water and Energy security for Europe

ITCOLD

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OPEN DAY ON DAMS



Dams and environment: engineering solutions for the future

TORINO , 28 maggio 2025

Replacement of main tainter gates of San Mauro's dam

stefano.munari@enel.com

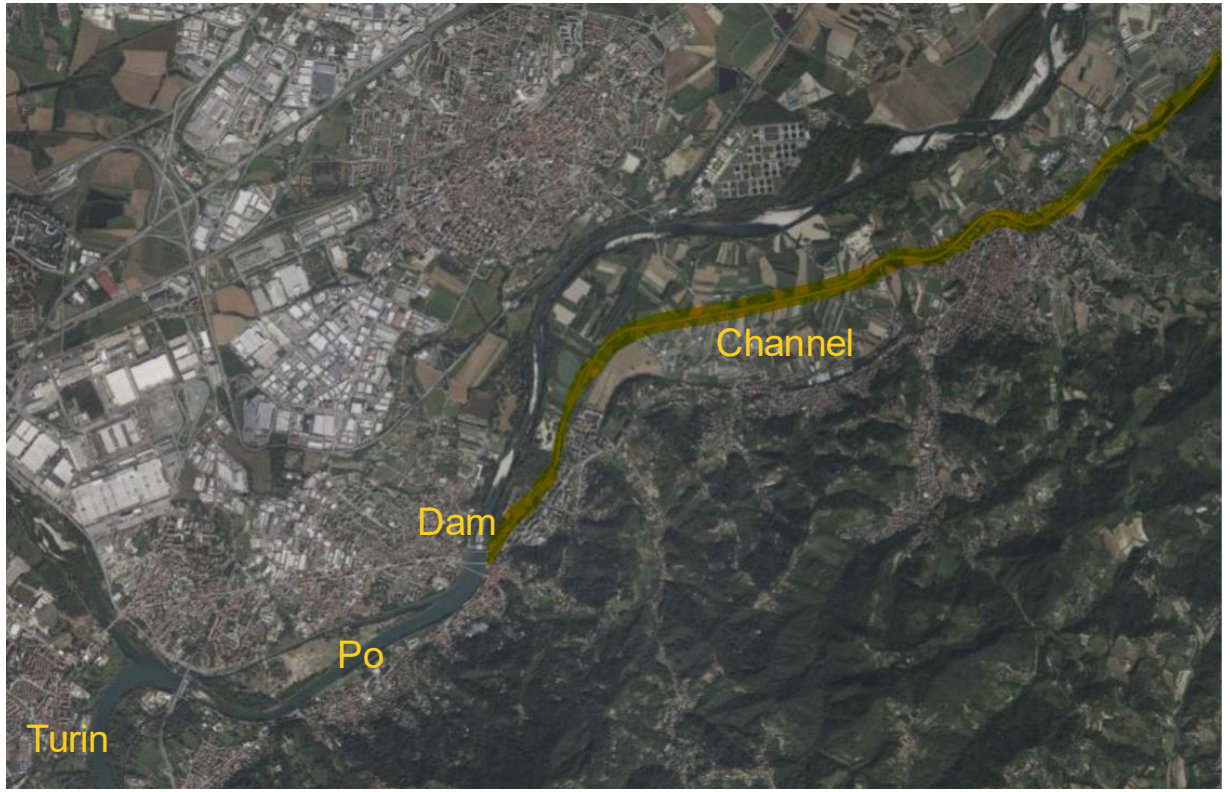
ITCOLD – II Concorso Fotografico

Replacement of main tainter gates of San Mauro's dam

Location of the project

- **Enterprise:** Enel Green Power Italia
- **Region:** Piedmont
- **Power plant: Cimena**
- **Type of plant:** Run of river
- **Total Power:** 22,8 MW
- **Annual energy production: 127,4 GW/h**









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Replacement of main tainter gates of San Mauro's dam

Inspection and status of the gates









- Gates from 1-4 – truss structure built in the 40s
- Gate 5 – tainter gate built in the 90s with drum gate on the top
- Gates A and B – built in 2002 in order to increase the capacity of discharge after the flow of 2000

Following inspection by the O&M staff, severe damage to the truss structures of the gates was found on gates 1 to 5. It was not possible to reassessment the safety conditions of these gates

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Replacement of main tainter gates of San Mauro's dam

Project and design: construction phases

PHASE (1 M€)

NEW STOPLOG CRANE – December 2023

March - December 2023

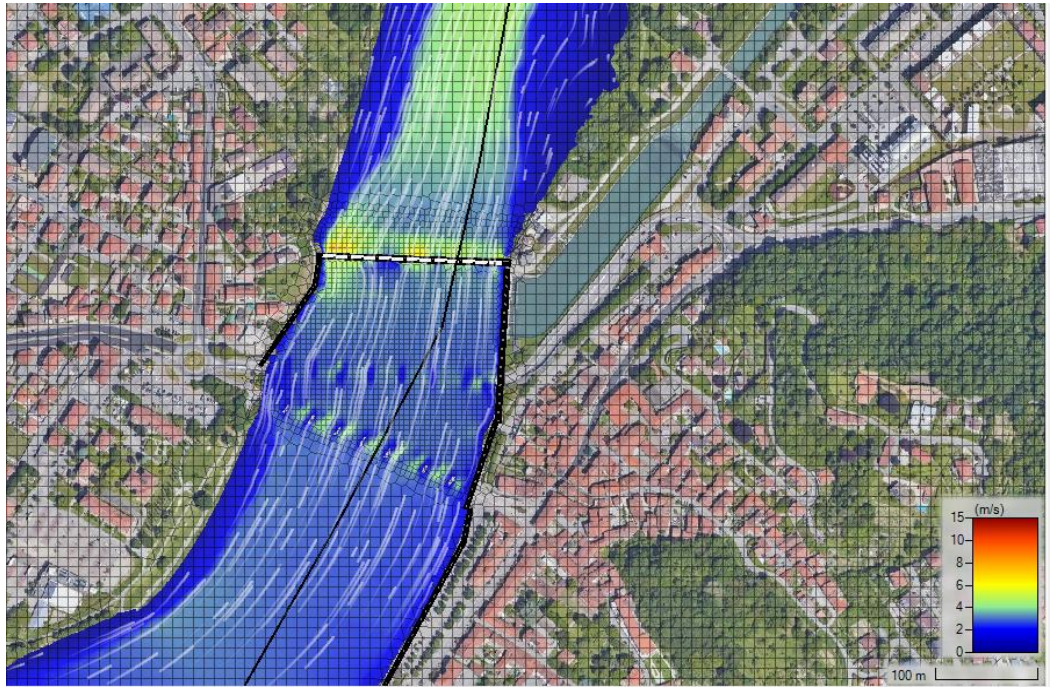
- New stoplog crane – capacity load 30 t
- Restoration of stoplogs bay
- New realization of small stoplog bay



PHASE 2 (3,9 M€)

REPLACEMENT OF 5 GATES – from January 2024

2024 – Gate 12.5 m + stoplogs
2025 – Replacement of 2 gates 25 m
2026 – Replacement of 2 gates 25 m



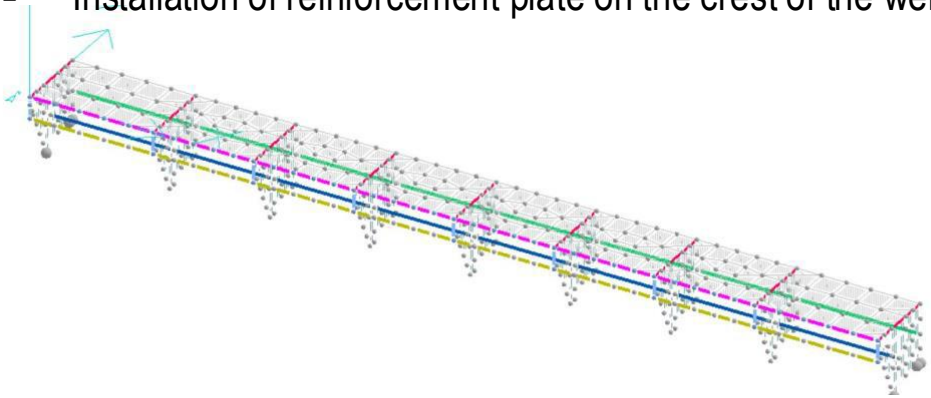
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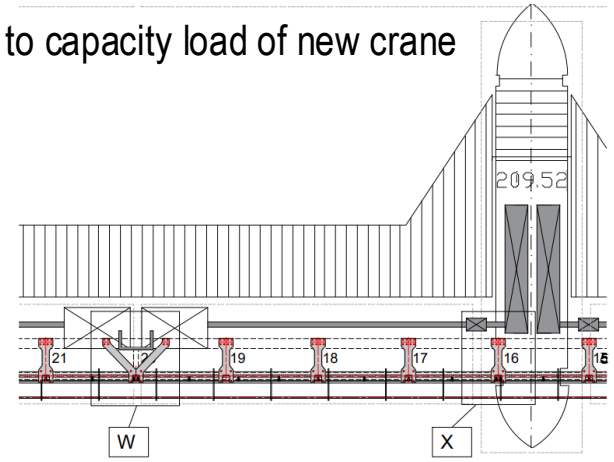
Replacement of main tainter gates of San Mauro's dam

Phase 1 – New stoplog crane (1/5)

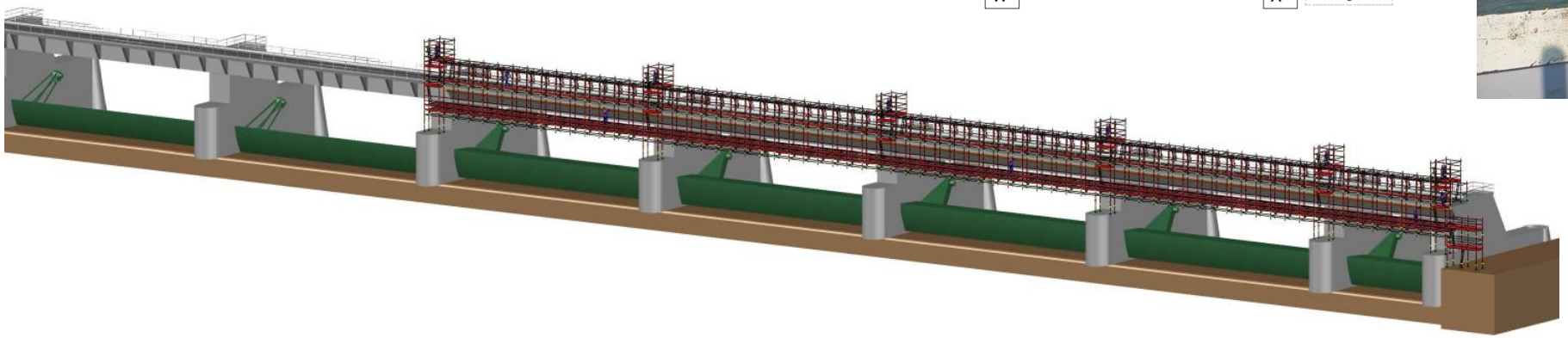
March - June 2023

- Construction site opening
- Scaffolding assembly on the weir
- Installation of reinforcement plate on the crest of the weir due to capacity load of new crane









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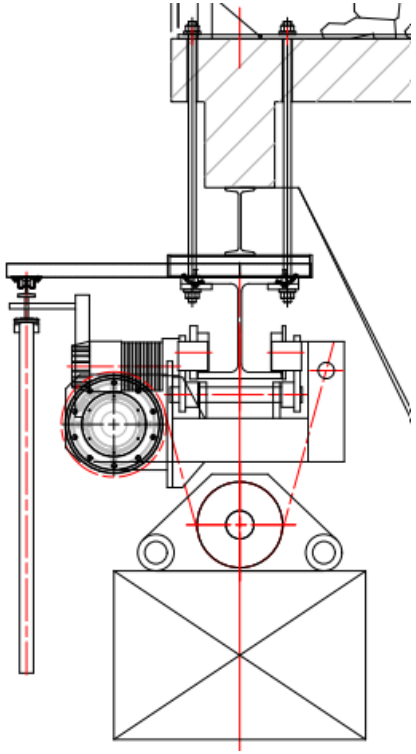
Replacement of main tainter gates of San Mauro's dam

Phase 1 – New stoplog crane (2/5)

July - September 2023

- Restoration of concrete beam of the weir
- New installation of steel beam type HEB 320 on the weir for new crane sliding (125 m)







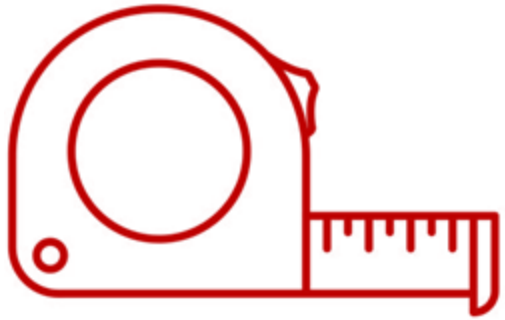
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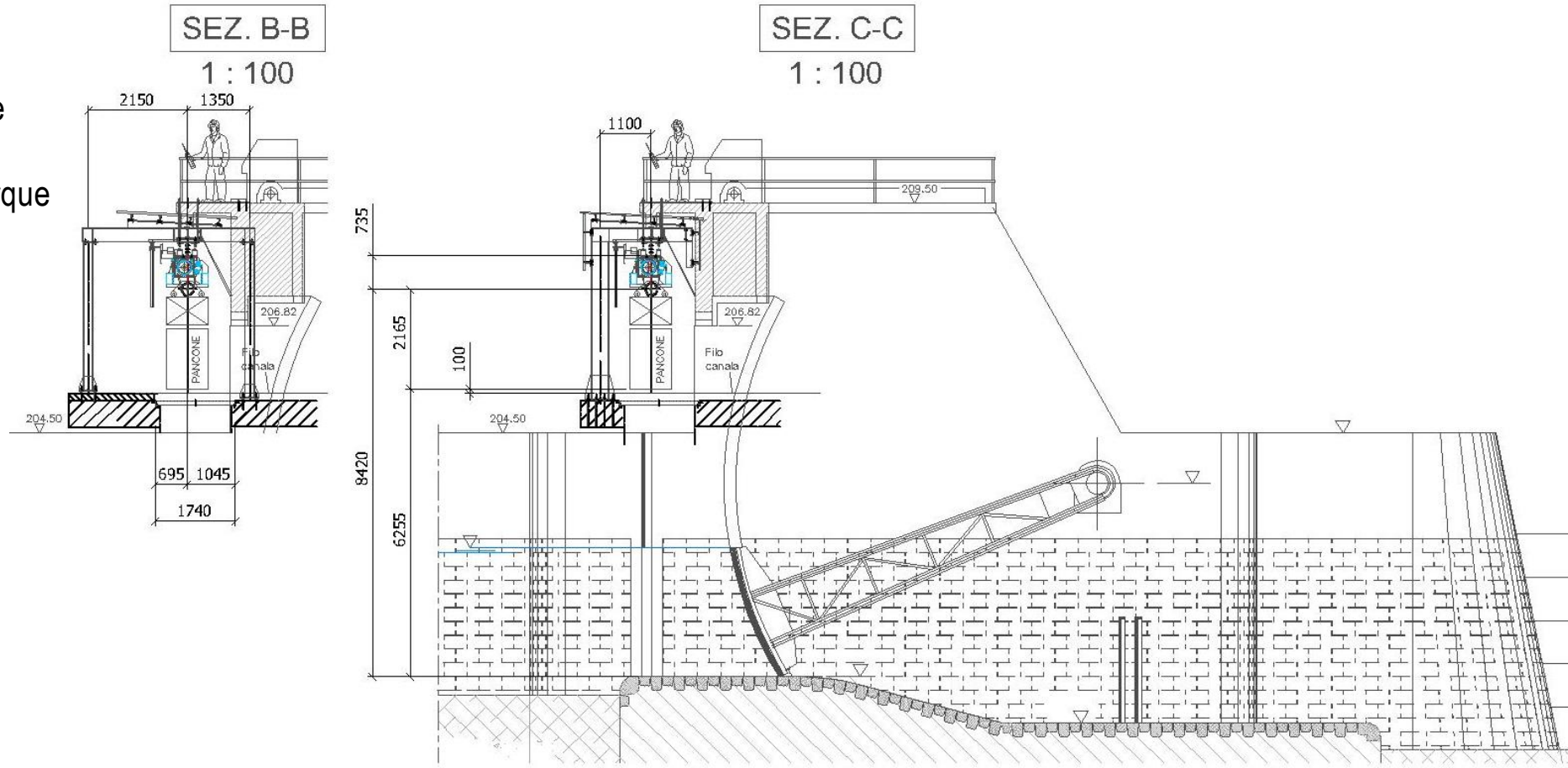
Replacement of main tainter gates of San Mauro's dam

Phase 1 – New stoplog crane (3/5)

July - September 2023

- Details of the new crane
- Site construction problems:
  - Little space for stoplogs passage
  - Little space for stoplogs bay
  - Concrete beam stressed with torque moment





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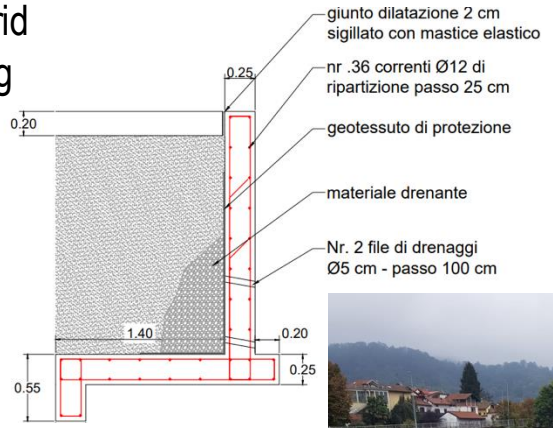
Replacement of main tainter gates of San Mauro's dam

Phase 1 – New stoplog crane (4/5)

October - November 2023

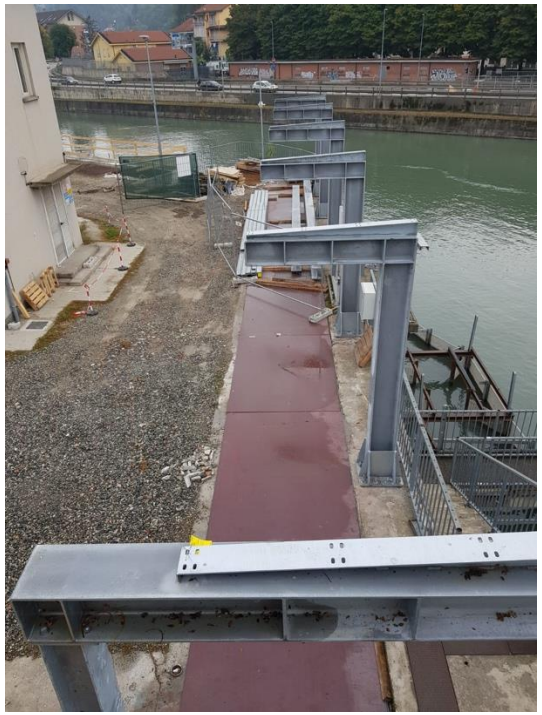
- Excavation of stoplog bay
- Installation of new covered steel grid
- New concrete slab for short stoplog
- Installation of new shelter for the crane











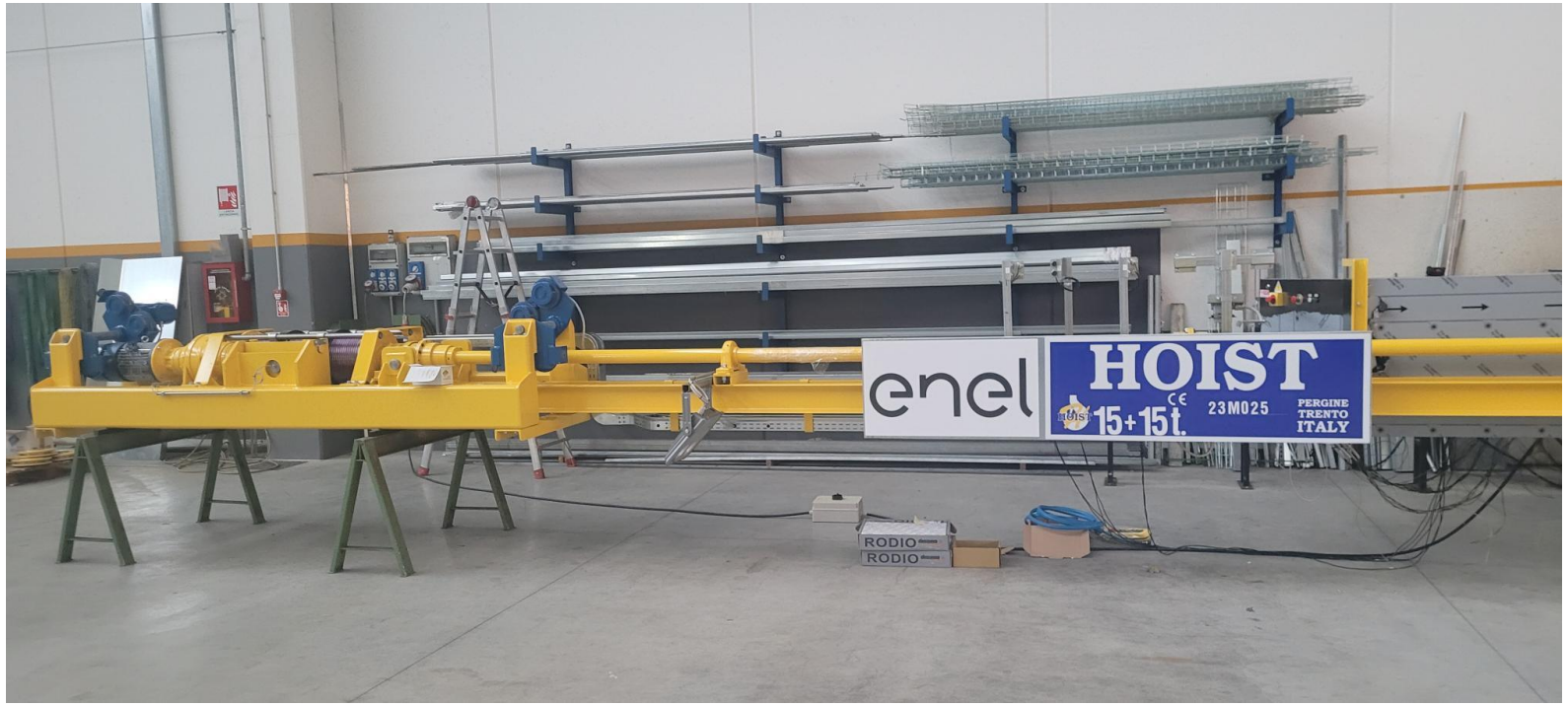
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Replacement of main tainter gates of San Mauro's dam

Phase 1 – New stoplog crane (5/5)

December 2023

- Final installation of the crane
- Official testing of the new crane with a load of 33 t
- Load limiter calibration
- Issued of conformity declaration on 2006/42/CE Machinery directive







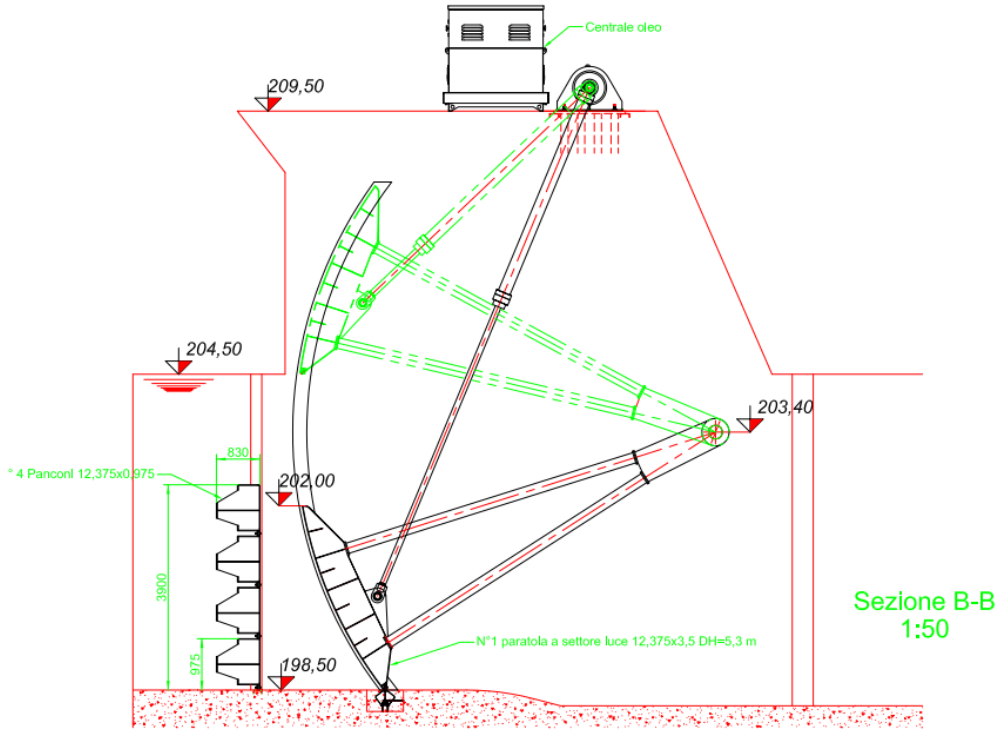
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Replacement of main tainter gates of San Mauro's dam

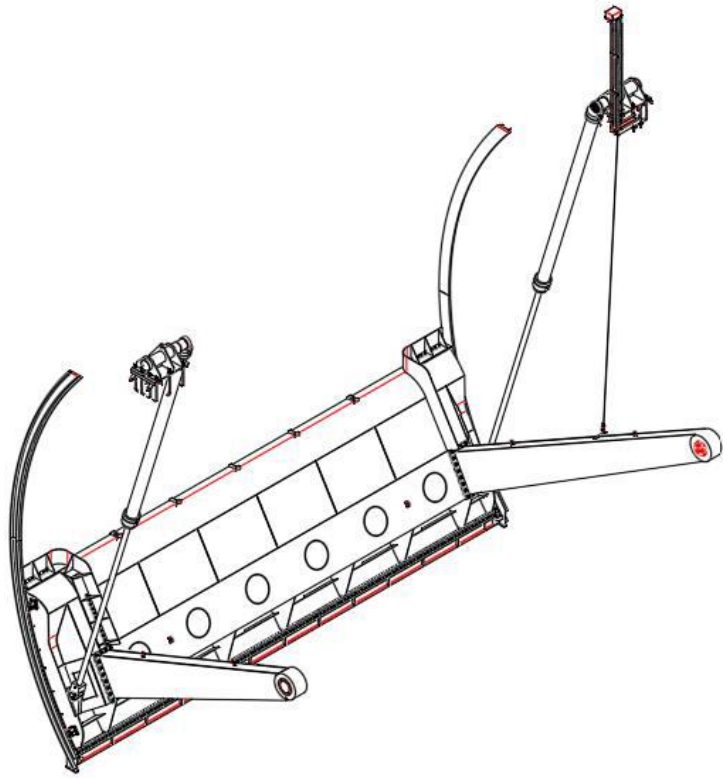
Phase 2 – Replacement of 12.5 gate (1/5)

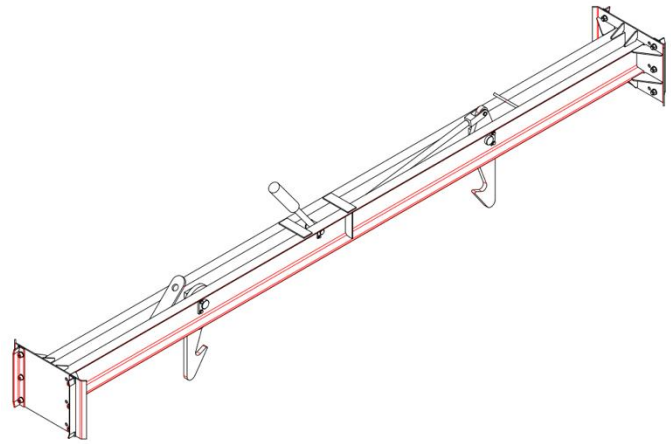
October-December 2023

- Project and design new tainter gate 12.5→ replacement of lifting system from steel chain to hydraulic pistons
- Project and design of new stoplogs – 3 sections due to the small dimensions from the floor and the lower part of the new crane
- Project and design new follower beam (lifting beam)



Sezione B-B
1:50





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Replacement of main tainter gates of San Mauro's dam

Phase 2 – Replacement of 12.5 gate (2/5)

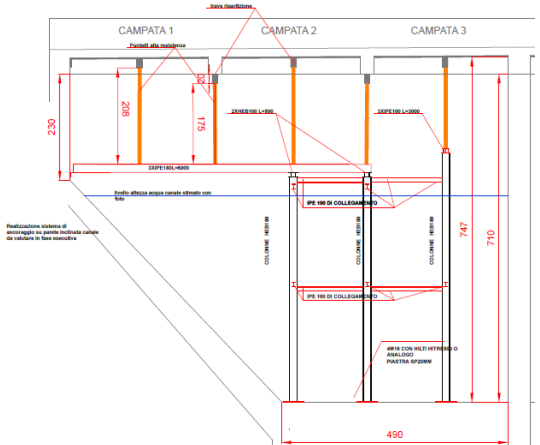
October-December 2023

- Design and realization of the temporary reinforcement of the access bridge of the barrage
- The actual bridge is realized by two concrete beam – capacity load only 26 t!
- New capacity load after the reinforcement → 60 t





SEZIONE TIPO



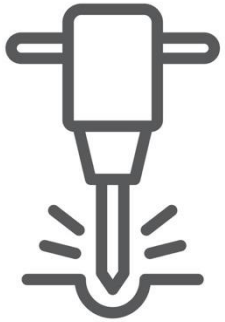
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Replacement of main tainter gates of San Mauro's dam

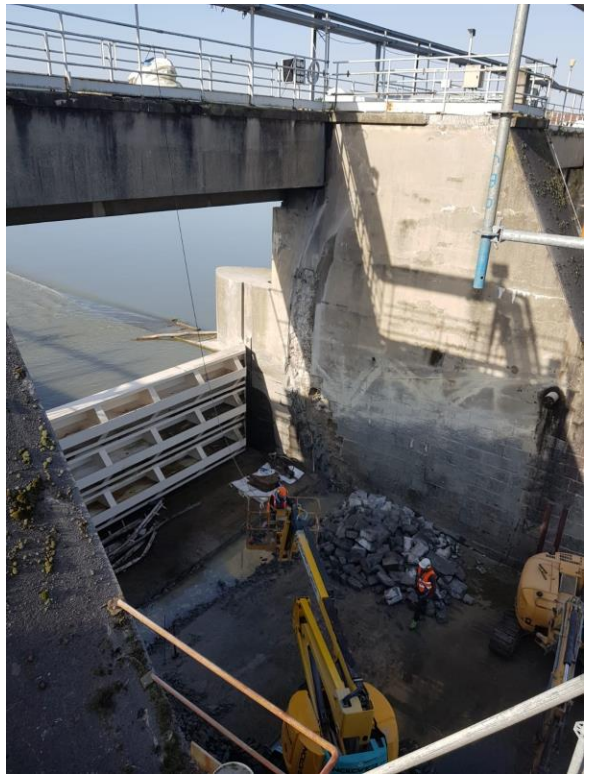
Phase 2 – Replacement of 12.5 gate (3/5)

April 2024

- Insert of stoplogs in front of the old gate → this phase was done by lowering the upstream level of the water
- Demolition of the old gate
- Demolition of the lateral and bottom sills → this phase take a lot of time due to circular shape of lateral sills







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Replacement of main tainter gates of San Mauro's dam

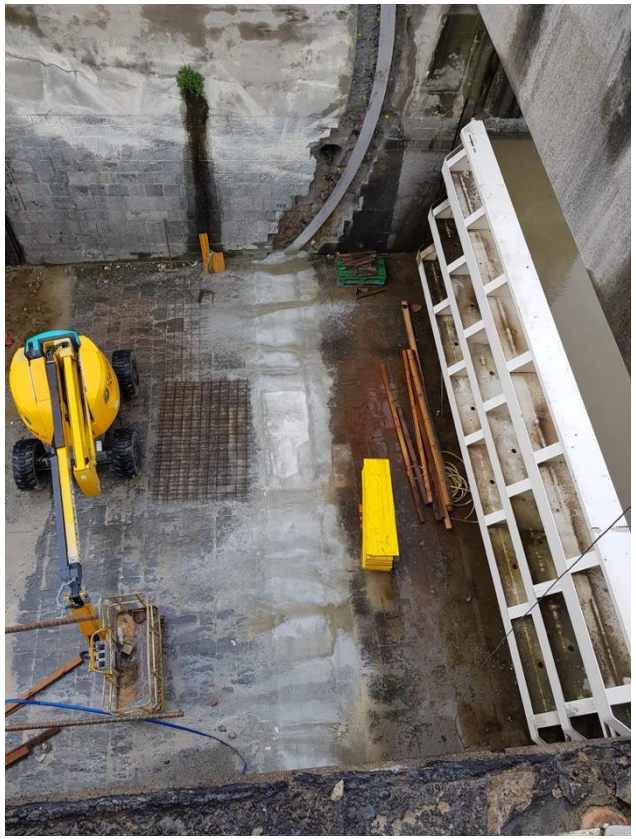
Phase 2 – Replacement of 12.5 gate (4/5)

May-June 2024

- Project and design new tainter gate 12.5→ replacement of lifting system from steel chain to hydraulic pistons
- Installation of new cylinder support
- Cleaning and reuse of rotation pins
- Realization of new bottom and lateral sills







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Replacement of main tainter gates of San Mauro's dam

Phase 2 – Replacement of 12.5 gate (5/5)

June 2024

- Hydraulic and functionality test of the new gate
- Leakage from the new gate is equal to zero
- Funcionality test was performed on 20 June with a positive outcome: the maximum value of oil pressure during the opening of the gate was 70 bar (nominal level < 105 bar).





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Replacement of main tainter gates of San Mauro's dam

Phase 2 – Replacement of 25 gates (1/5)

January 2025

- Project and design new tainter gate 25 m→ replacement of lifting system from steel chain to hydraulic pistons
- Realization of construction track on the river downstream the weir → change of track in order to use the gravel island showing into the satellite image





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Replacement of main tainter gates of San Mauro's dam

Phase 2 – Replacement of 25 gates (2/5)

February 2025

- Project and design new tainter gate of 25 m→ replacement of lifting system from steel chain to hydraulic pistons
- Transportation and installation of one 25 m gate (gate nr. 4) → EXCEPTIONAL TRANSPORT (total lenght of the gate is 25 m!)
- Installation and assembly of lateral gate arms







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Replacement of main tainter gates of San Mauro's dam

Phase 2 – Replacement of 25 gates (3/5)

March 2025

- Transportation and installation of another 25 m gate (gate nr. 3) → EXCEPTIONAL TRANSPORT (total lenght of the gate is 25 m!)
- Installation and assembly of lateral gate arms





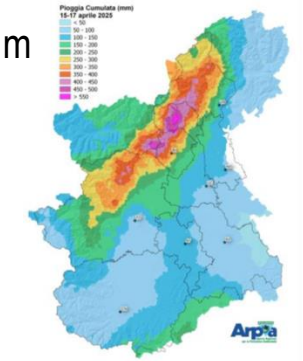
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Replacement of main tainter gates of San Mauro's dam

Phase 2 – Replacement of 25 gates (4/5)

April 2025

- From 15 to 17 April 2025 heavy rainfall hit the Piedmont area (in local area precipitation > 500 mm
- Deposit of tree trunks on stoplog system
- Max water level on San Mauro - 204.61 m (max flow 2750 m^3/s)
- Little damage on the end of temporary scaffolding between gate 3 and 4









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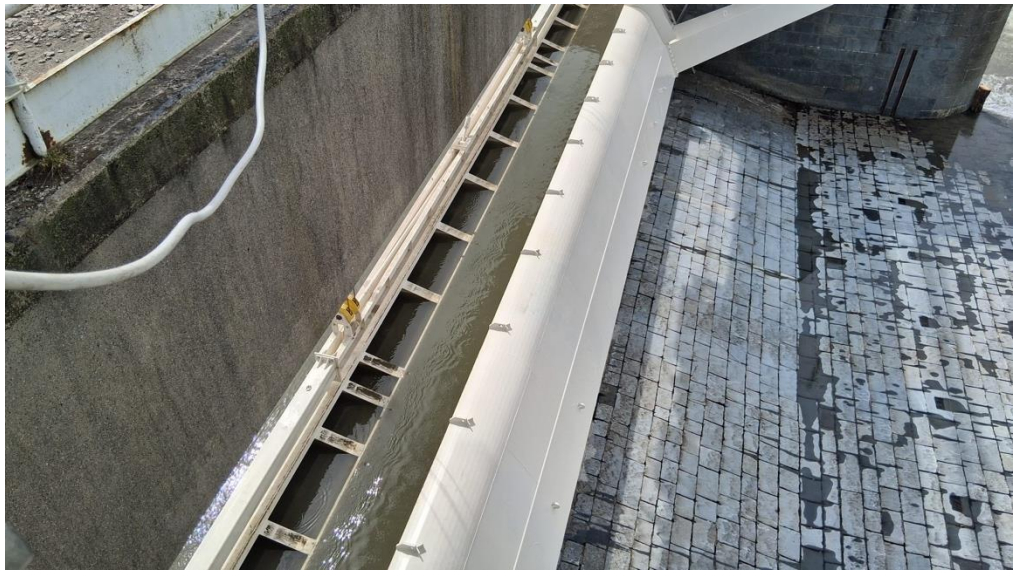
Replacement of main tainter gates of San Mauro's dam

Phase 2 – Replacement of 25 gates (5/5)

April 2025

- Remove of three stoplogs from gate 3 with normal water level on the barrage (201.90 m)
- Deposit of them on stoplog bay







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Replacement of main tainter gates of San Mauro's dam

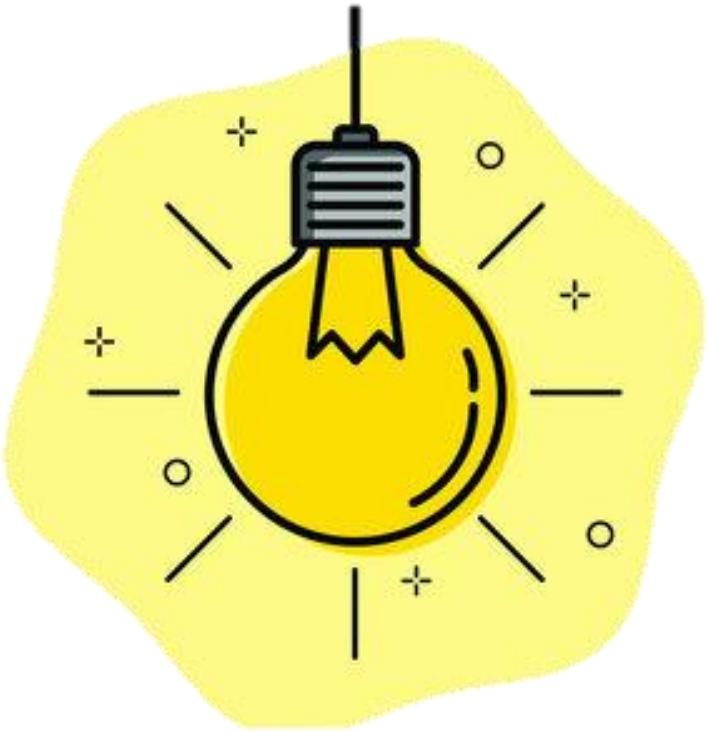
Conclusion

1. Use of stoplogs permits to increase safety conditions of the site construction and avoids the loss of energy production of the power plant (only few days of out of service)

2. For old structures the safety reassessment from original drawing is very hard and expensive: often the completely replacement of the structure is the only solution

3. For this site construction the schedule is very important: due to the important flow of the Po river only in winter season it is possible to work

4. Change of lifting system of gates permits to increase safety conditions and in case of failure allows maintenance work without water problems



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Thank you

Green Power