



## Donggang Cable Tunnel, Dalian, China Case Study



### Industries:

Power (Authority) Dalian Municipal

### Regions:

China

### Summary:

- World's largest Electro osmosis installation at 43.000 sqm System and design delivered by Triton Norway.
- So successful we made the Chinese media
- The remaining 107,000 sqm of construction is currently on hold

### Timings:

- The design of the MPS® (AOP) system took 12 weeks
- The assurance acceptance of the design took 40 weeks.
- Structure was available for fit out 5 months after work starting on site
- Estimated drying time 2 months

### Success Criteria:

- The reinforced concrete tunnel is a capillary structure
- The structure is fully below the water table.
- Design layout according to proven design solutions for this structure.
- AOP is the only water ingress solution chosen for this cable tunnel constructed through reclaimed land.

### Pulse Boxes:

- 27 AOP control units were delivered to this project.
- In addition, a remote monitoring system was applied to the design.

## Problem

The structure is a cut and cover tunnel reinforced concrete box that acts as a cable and utility tunnel. The surface area of the total internal structure is 170.000sqm. The targeted area for the installation was 43.000sqm.

The tunnel is placed on reclaimed land and consists mostly of wet clay. The water ingress problems started even before the laying of the tunnel was completed. The regional state design institute was in charge of choosing the waterproofing to be used in the design.

They had decided to implement Electro osmosis as the sole waterproofing solution for the tunnel. No bentonite mats or other forms of waterproofing was added to the design. The design institute endorsed the MPS for use on the tunnel and later also the AOP system.

## Challenges

There were several years of delay during the construction of the tunnel, but finally the MPS installation could commence. We built a special jig which could cut multiple cuts in one pass and the anode installation turned out very nice. After the anode and cathode installation was completed, Hydrotech terminated as a company and could not deliver the control units or do the commissioning. In the wake of this, the Norwegian development department of Hydrotech, established a new company called Triton Norway. We were asked by the Chinese regional design institute to complete the installation. We further enhanced the MPS control units and designed a bespoke remote monitoring system specific for this installation. We rebranded the name of the system to AOP and delivered 27 control units to cover the 43.000sqm target area..

## Contract

The contract was let by Dalian Deli Electro osmosis technology ltd company and was tendered on the basis of the specifications from the regional design institute. The MPS and AOP was the preferred waterproofing system approved by the design institute. The design institute was so convinced of the superiority of the MPS/AOP system, that they did not include any other waterproofing solutions in the design of the tunnel.

The tunnel was placed underground on reclaimed land next to the sea and was exposed to massive amounts of water.

## Outcome

The completion of the anodes and cathodes was done in 2011, and the delivery of the 27 AOP control units and monitoring system, was in 2013. We have also installed a junction box for each 150meters.

Due to the Clients delay of installing power in the tunnel, the commissioning have yet to be performed to date.

## AOP system

The MPS System is an evolutionary technology based on an accepted theory. It gives new life to existing brick, masonry and concrete structures avoiding expensive reconstruction and has a broad field of application in new concrete structures. The "state of the art" methods in use in the building industry today can be characterised as temporary solutions to a problem for which there is no apparent cost effective permanent solution. The MPS System provides a permanent solution. The MPS System is utilised for transporting water encapsulated within the capillaries out of structures, as well as permanently preventing the penetration of water into structures. A control unit produces a low voltage electrical charge, which is passed through electrodes in the form of probes or wires strategically placed within portions of the walls and/or floors which are wet.