



Corrosion Technology Services

Case Study: CS-03-05-2013

Louvre Abu Dhabi, UAE

Cathodic Protection to the Reinforced Concrete Substructure

Start:	2013
Completion:	2015
CP Project Cost:	US\$ 3 million
Scope of Project:	Cathodic Protection of the Reinforced Concrete Substructure

Introduction

The Louvre Abu Dhabi is situated in Saadiyat Cultural District and will be approximately 24,000m² in size. To mitigate corrosion problems created by the seawater and the harsh Middle East environment, Cathodic Protection (CP) is installed on all exposed surfaces of the reinforced concrete sub-structure up to a height of +3.45m.



Model of the Louvre Abu Dhabi superstructure

System Description

An Impressed Current Cathodic Protection (ICCP) system using Mixed Metal Oxide (MMO) coated titanium anode ribbon mesh is installed to protect the exposed concrete surfaces of the substructure for a design life of 100 years.

The system is monitored by using a combination of Ag/AgCl reference electrodes and mixed metal oxide pseudo electrodes, which are embedded in the concrete throughout the exposed surfaces of the substructure.

The CP system does not interfere with the architectural beauty of the structure as all components and cables are encapsulated within the concrete. Cables exit the structure within the building through conduits at specific locations which are then terminated in junction boxes located within the building.



Louvre Abu Dhabi during early construction

The following areas of the structure are under cathodic protection using MMO anode ribbon mesh:

- Strip footings
- Basement Slabs
- Lower Ground Floor Slabs
- Tidal Pools
- External Walls



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Anode Installation

Due to the complexity of the structure and to mitigate problems with anodes contacting the steel during a concrete pour, anodes were installed in the screed to protect the rebar in the lower reinforcement of the strip footings and slabs. For all other surfaces the anodes were fixed to the rebar cage using plastic clips.

To avoid issues with current distribution, anodes in the screed are powered independently to anodes fixed to the rebar clips.



Anodes fixed to the concrete surface prior to the application of a second layer of screed

CP Power and Monitoring

The system is powered by multi-channel air-cooled Power Supply Units. The structure is divided into approximately 100 zones; each zone has 3 Ag/AgCl and 3 MMO pseudo electrodes.

Due to the size and complexity of the CP system a remote monitoring and control system is utilized. Some features of the monitoring and control system are detailed below:

- Energize / de-energize each zone
- Read and set operating parameters
- Monitor each zone in real time
- Conduct global depolarization tests
- Set high/low limits (Alarm enabling)



Anodes & conductor bar fixed to rebar clips

Commissioning and Performance

The CP system is expected to be commissioned in late 2014 and will be assessed using the following the following criteria:

- An instant off potential more negative than -720mV with respect to Ag/AgCl RE's
- A potential decay of at least 100mV from instant off

Project Statistics

80,000m² of concrete s.area protected
250,000m of anode ribbon mesh
500 Ag/AgCl Reference Electrodes
500 MMO Pseudo Electrodes
10km of component cable
Approximately 100 Zones
500 CP design drawings