Case Study - Buildings

The Holy Temple of Saint Constantine and Santa Helen

Glyfada, Athens

February, 2008/ June, 2008

The Holy Temple of Saint Constantine and Santa Helen

Aim	The Holy Temple had suffered from some stability issues due to former seismic activities in the region. During the renovation, it was decided to monitor the cupola, which had suffered the most from earthquakes, with the use of fiber optic sensors.
Location	Glyfada, Athens
System Integrator	H + S Technology Solutions S.A and SmartSensing
End Customer	Archdiocese of Glyfada, Athens
Date	February and June 2008
Instrumentation	(1) Micron Optics sm130 @100Hz, Optical Sensing Interrogator
Sensors	(8) Smart Fibres, SmartPatch surface mount FBG strain sensors (1) Smart Fibres, SmartPatch temperature sensor
Software	Micron Optics ENLIGHT^{Pro} Sensing Analysis Software
FBG Technology Benefit	Reliability and Stability and easy to install.

The Holy Temple of Saint Constantine and Santa Helen

- The Temple of Saint Constantine and Santa Helen (Greek: Ιερός Καθεδρικός Ναός Ἁγίων Κωνσταντίνου & Ἑλένης Γλυφάδας) is an Orthodox church in Glyfada, a city close to Athens Greece. The church is dedicated to Saint Constantine and Santa Helen, discoverers of the True Cross and its feast day as saints of the Orthodox Christian Church is celebrated on May 21.

The Holy Temple of Saint Constantine and Santa Helen

- The church is centrally planned, having the form of a Greek Cross. It has a large central dome supported on four pendentives and buttressed on each side by a lower semi-dome or apse. Beneath each semi-dome is a gallery supported on an arcade.
- The dome is 25 m high, while the main gold plated cross is another 4 m high, which gives a total of 29 m to the height Temple of Saint Constantine and Santa Helen. The peak is 29 m; therefore the church holds a dominant position in Glyfada's cityscape and is visible from all approaches to the city.

The Holy Temple of Saint Constantine and Santa Helen

- The project completed in 2 phases: 1st phase: 02–04 Feb 2008, 2nd Phase: 03-05 June 2008.
- It was the key requirement of the customer that the monitoring system should be very stable and reliable, as the sensors were placed in the cupola of the temple, 25 meters above ground, and there would be no capability to access them in the future. The monitoring system should be very easy to install, and the whole process should be completed in extreme care, in order not to harm the hagiographies of the temple.

Instrumentation:

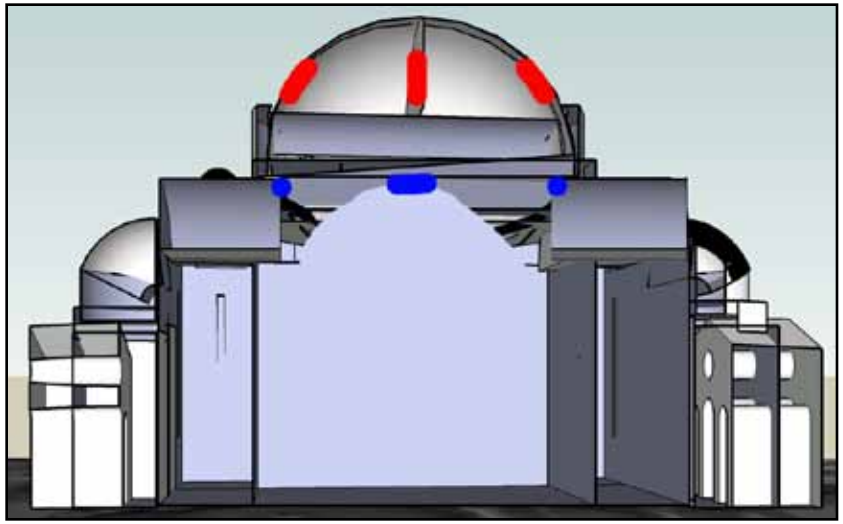
sm130 Optical Sensing Interrogator

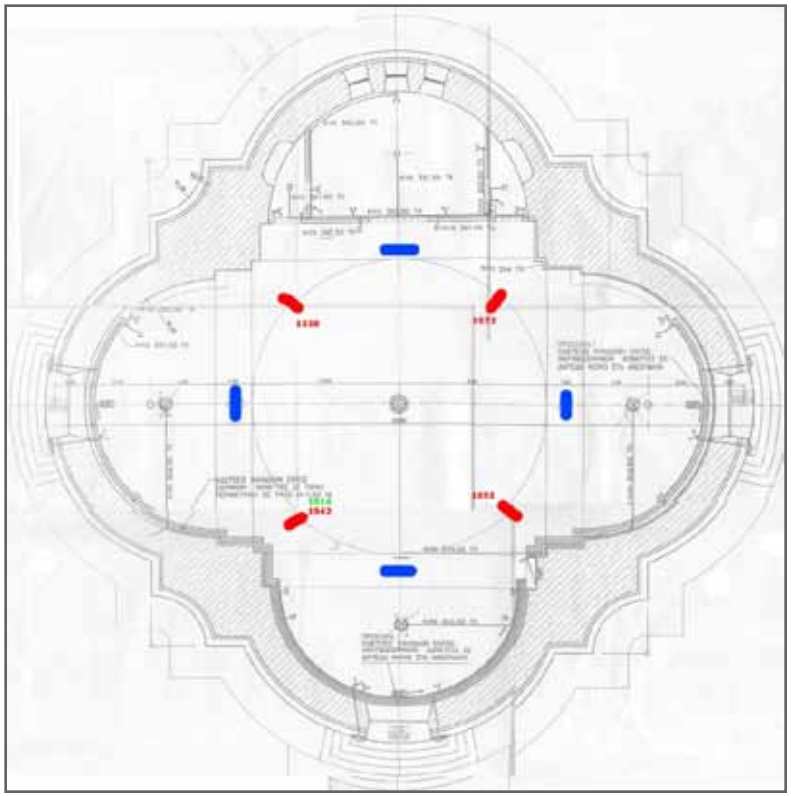
SmartPatch

SmartTemp

The Holy Temple of Saint Constantine and Santa Helen

- After the completion of a site survey, 8 spots were chosen, each of them placed on a 90 degree corner. In that way the measurements of the strain would be relative to the weight of the cupola.



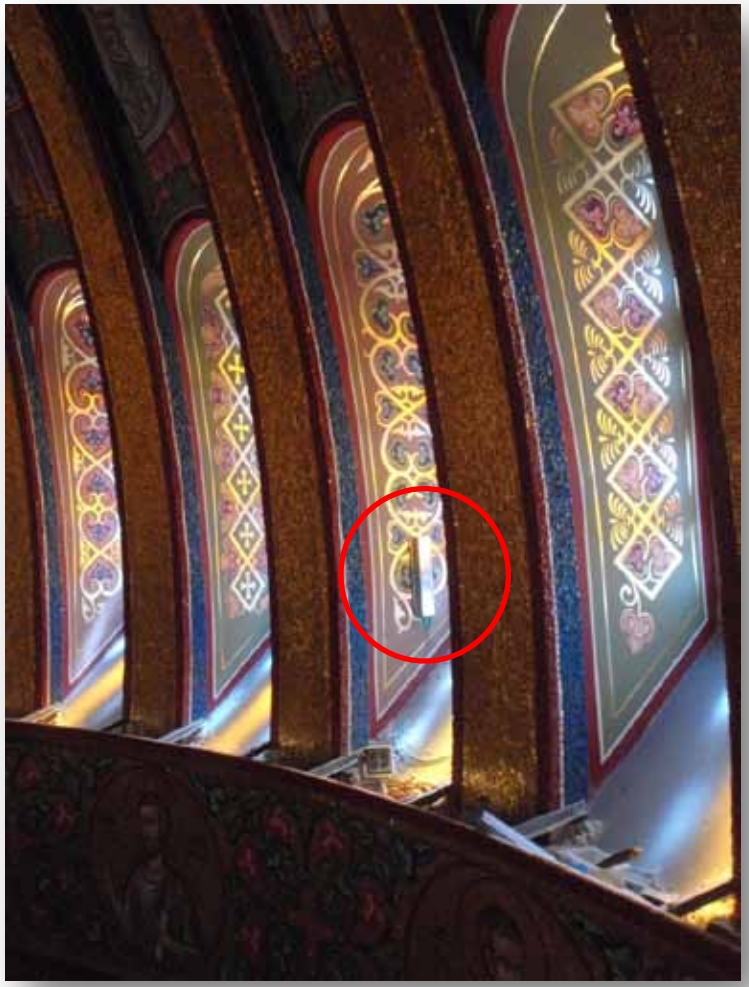


The Holy Temple of Saint Constantine and Santa Helen - Installation

- Installation in the center of the four domes.

The Holy Temple of Saint Constantine and Santa Helen - Installation

- Installation on the pillars of the cupola.

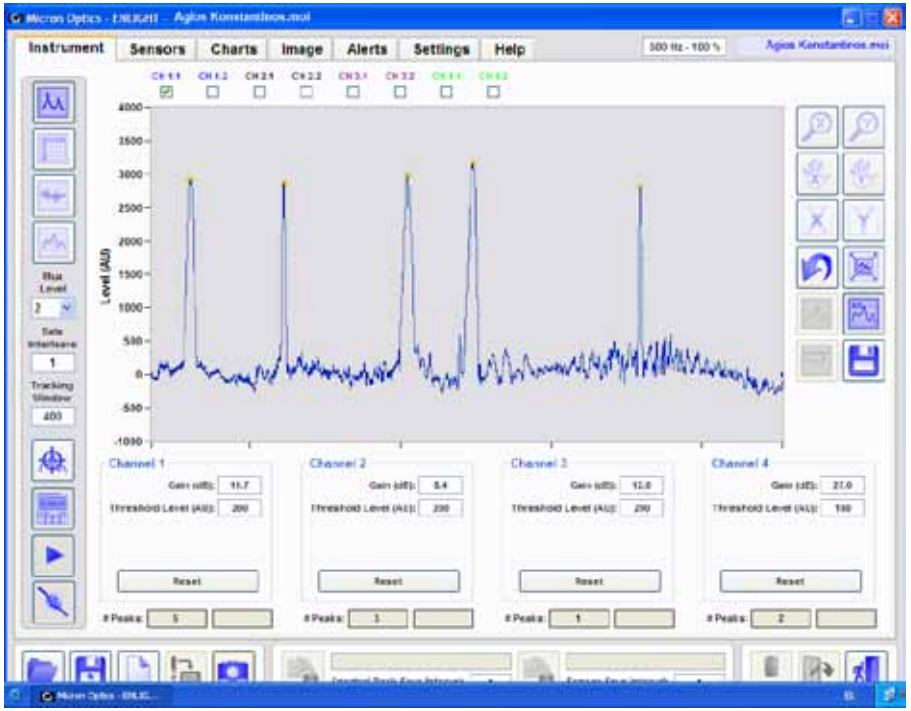


The Holy Temple of Saint Constantine and Santa Helen – Data Results

- ENLIGHT^{Pro} Sensing Analysis Software

Image View indicates where sensors are placed.

Instrument View manages data connections.



- Results
  - All sensors are multiplexed and data is accumulated in the monitoring unit placed in the office of the Holy Temple. In case of an alert, messages are sent to the Archdiocese, H+S, and the Temple's vicar.
  - The information gathered is very useful to the customer, as the Archdiocese is now capable of taking the necessary measures required to protect the temple from future earthquakes.
  - The installation was very easy and actually only two days were needed for the completion of each phase. The installation was actually one of the reasons why an FBG system was chosen instead of one using conventional sensors.
  - The customer was fully satisfied, and is in constant communication with H+S for the realization of similar projects in other temples.

- Acknowledgements
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