Catholic University of Angola

CASE STUDY | SERVICES BUILDINGS

General Information

Owner: *UCAN – Catholic University of Angola*

Business Type: Education

Location: Luanda, Angola

Description

The new building of the rectory of the Catholic University of Angola (UCAN) is located in Luanda, Angola (Figure 1). It was designed, fabricated and erected by the VESAM Group between 2015 and 2016.

This new building comprises six floors with a total area of 6500 square meters (Figure 2). The columns and beams are in structural steel supporting a composite slab made of concrete cast on the top of a steel profiled sheet used both as formwork and structural steel (Figure 3). The foundations are in concrete. The connections made in situ between steel members are bolted.

The building presents a large concrete frame comprising two cores acting as columns, located in opposite sides of the building, and a pre-stressed beam on top (Figure 4).

Figure 1 – New Rectory building of UCAN.

Figure 2 – Construction of 2nd floor.

Figure 3 – Composite slab.

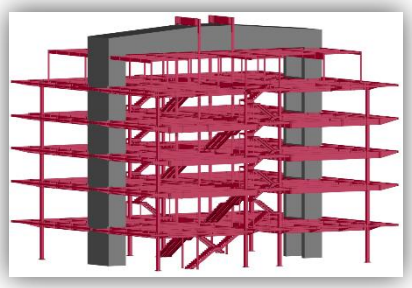

Figure 4 – Concrete frame and steel structure.

SHM Installation

The adopted structural health monitoring (SHM) installation comprises the complete monitoring of several cross sections of the steel frames: 1) near to the beam supports where the negative bending moment is maximum; 2) near the mid-span of the beams where the positive bending moment is maximum; 3) at the mid-section of the core columns where the axial stresses are maximum and minimal (Figure 5).

The instrumentation comprises the following sensors: 1) 16 strain gauges; 2) 2 accelerometers; 3) 1 weather station (wind speed and

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direction, rainfall); 4) 1 temperature sensor; 5) 1 relative humidity sensor; and 6) 1 corrosion sensor.

The data acquisition unit (SIGMA) is located in ground floor and connected by wire to all sensors. It is powered directly from the electrical network of the building. All equipment is provided by the VESAM Group.

The adopted communications protocol for data transfer between the SHM system and the VESAM servers is by GPRS/GSM. The data are collected by the data acquisition unit and sent on a periodically basis to the VESAM server.

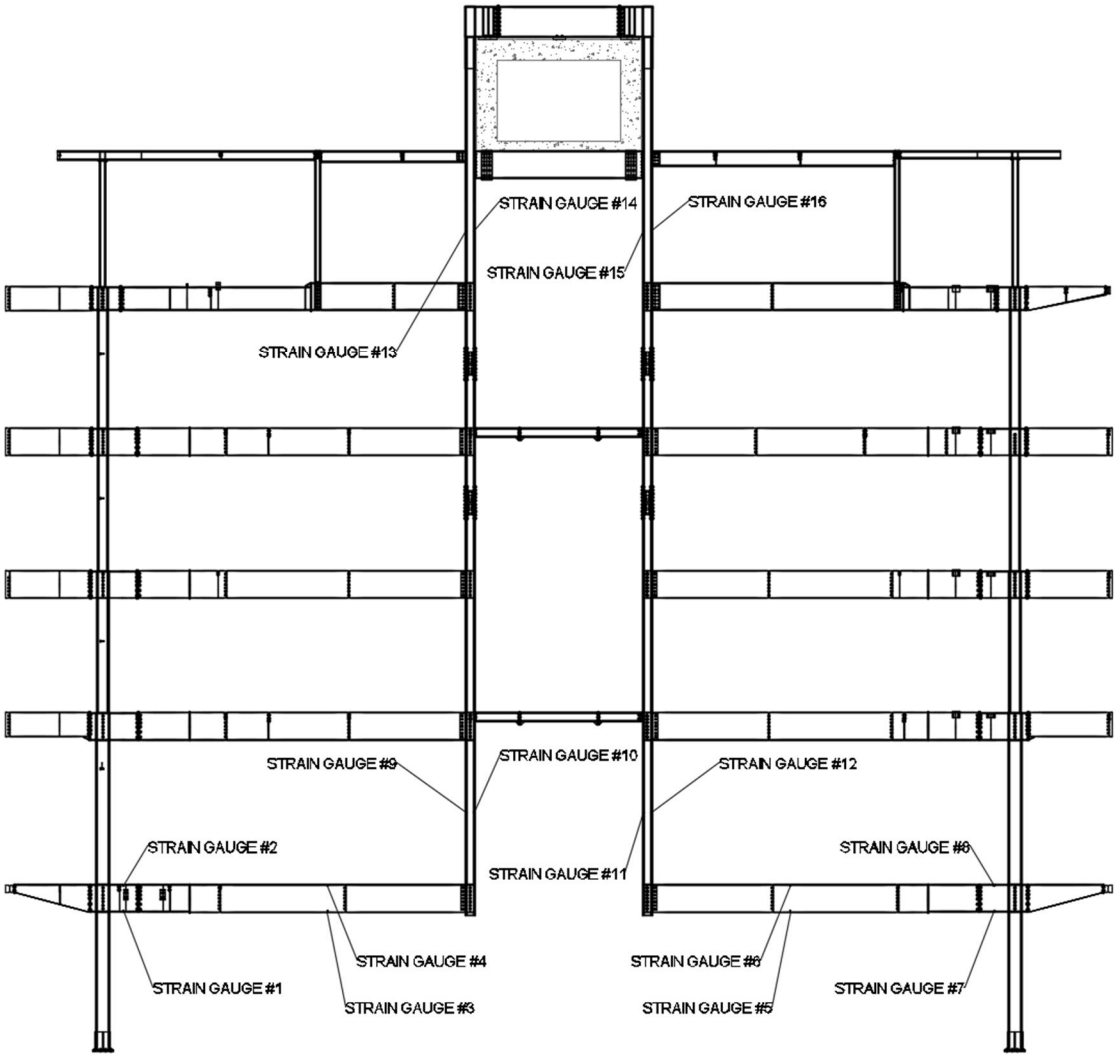

Figure 5 – Instrumentation of the steel frame (columns and beams).

Expected Benefits

Our client (UCAN) receives from VESAM, on a daily, weekly or monthly basis, technical reports containing the variation of each monitored parameter. The collected data are also used to calibrate several deterioration models (corrosion, fatigue, among others). On a monthly basis, the status of each deterioration model is reported to our client advising about the need of visual inspections, in situ testing or/and maintenance works. When extreme events are detected, an alert is issued to the client by e-mail, SMS or phone, to provide a fast intervention.

Our client can also access all the information related with the SHM installation by using the online SIGMA SHM portal provided by VESAM.

With this SHM solution, starting from USD 26.500, our client expects to save more than USD 25.000 each year by avoiding regular building inspections and unexpected maintenance operations.

A reduction of the insurance cost for the building is also possible since the structural behavior during an extreme event (earthquake, fire, vehicle impact, among others) is well known. This way, the repair and strengthening works can be estimated more accurately. Moreover, future projects with the same type of structural system can be improved and, therefore, can lead to savings.

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