

Steel Fabrication Shop

CASE STUDY | INDUSTRIAL UNITS

General Information

Owner: Private company

Business Type: Structural Steel Fabricator

Location: Cantanhede Industrial Park, Portugal

Description

This industrial unit is located in the Industrial Park of Cantanhede, Portugal. It was designed, fabricated and erected by the VESAM Group in 2008.

The industrial unit comprises an office building with two floors located side-by-side with the main production unit of the company (Figure 1). The entire structure was fabricated with cold-form steel profiles, adopting bolted joints and steel-concrete composite slabs with profiled steel sheets. The foundations are in concrete and cast-in-place.



Figure 1 – Industrial unit.

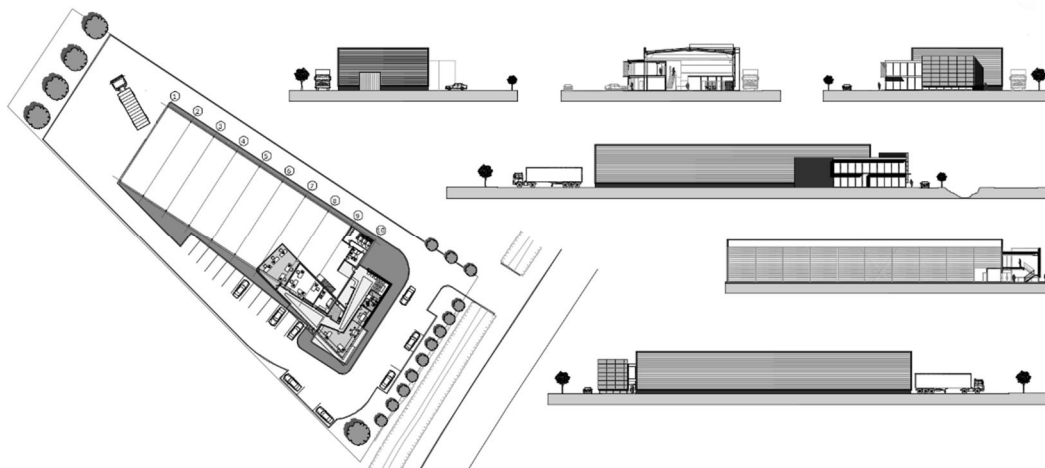


Figure 2 – Office and production unit.

SHM Installation

The adopted structural health monitoring (SHM) installation comprises the complete monitoring of the steel frame nr. 4 (Figure 2) of the industrial unit in several cross sections (Figure 3).

The instrumentation comprises the following sensors: 1) 18 strain gauges; 2) 2 accelerometers; 3) 1 weather station (wind speed and direction, rainfall); 4) 1 inductive loop; 5) 2 temperature sensors (indoors and outdoors); 6) 2 relative humidity sensors (indoors and outdoors); 7) 1 corrosion sensor with two cells; and 8) 1 gutter sensor.

The weather station and the gutter sensors are installed in the roof of the production unit. The inductive loop is located in the main entrance of the unit.

The data acquisition unit (SIGMA) is located indoors, near to the monitored steel frame, and connected by wire to all sensors. It is powered directly by the internal power network. 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.

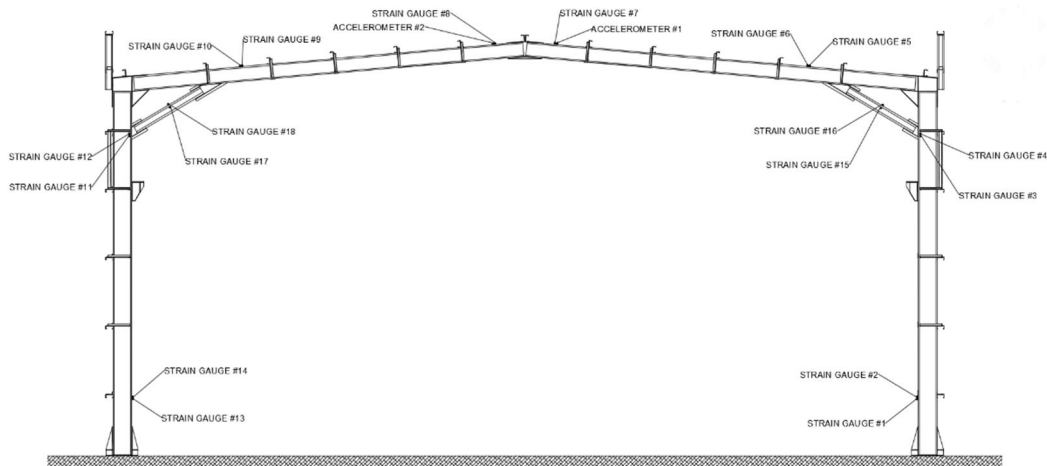


Figure 3 – Instrumentation of the cross sections of the steel frame nr. 4.



Figure 4 – Installation of data acquisition system.



Figure 5 – Gutter sensor in the roof of the industrial unit.



Figure 6 – Weather station in the roof of the industrial unit.



Figure 7 – Inductive loop for traffic control.



Figure 8 – Strain gauge (with anti-shock protection) installed in the base of the column.

Expected Benefits

The company receives 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 the head of engineering maintenance 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 person in charge by e-mail, SMS or phone, to provide a fast intervention.

All the information related with the SHM installation can also be accessed by using the online SIGMA SHM portal provided by VESAM.

With this SHM solution, starting from USD 25.000, the company expects to save more than USD 20.000 each year by avoiding regular building inspections, unexpected maintenance operations and, moreover, by reducing the insurance costs.

Since the behavior of the building during an extreme event (earthquake, fire, vehicle impact, among others) is well known 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.