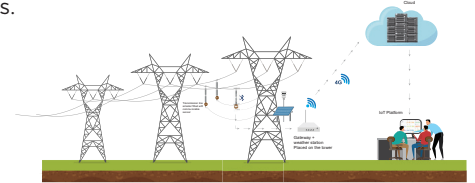


Real-Time Transmission Vibration Monitoring Sensor

The demand for electrical energy continues to rise so ensuring the reliability and safety of electrical infrastructure becomes a priority. All the OverHead Transmission Line (OHTL) plays an important role which are subject to constant stresses. In particular, phase conductors, ground wires and OPGW cables of TL may undergo vibrations and oscillations phenomena when subjected to the wind. In some cases, if these wind-induced motions are not controlled, consequences may be catastrophic. Understand and feel the line is finally the key point for reliability, maintainability and safety. With this in mind, an access to the conditions of transmission lines in real-time will be very interesting. That is why Sicame decided to develop the vibration monitoring solution. Thanks to this solution, early signs of potential failures and issues will be detected. Anticipate and preventive actions will be taken to avoid costly breakdowns and service interruptions.

Complete autonomous communicate system

- Identify and characterize the level and **phenomena of vibration**
- Evaluate the probability of future **fatigue damage** in the conductor
- **Evaluate** the performance/efficiency of conductor and all damping system
- Operate on a line for **DLR (Dynamic Line Rating)**



Measurement system

From our expertise to your supervision



Offer

For an expertise or for a new line commissioning, from several weeks to several years, our system will meet your requirements.



Installation

The equipment are designed to simplify the installation and to be adaptable with your structure. The sensor can be installed by drone without power interruption.



Measurement

Vibration, current, cable temperature, weather data in real time.



Analysis

The measurement are analyzed to obtain technical workable results, fatigue analysis for quick conclusion.



Supervision

The IOT platform gives all data needed to understand what see the line day by day. Be ready to operate in live if needed for maintenance or DLR.

Lightweight vibration sensor

Vibration measurement

- Lightweight to not impact the measure
- Acceleration, frequency
- Aeolian vibration
- Subspan oscillation
- High amplitude / galloping

DLR measurement

- Conductor temperature
- Current

Energy autonomous

- Integrated solar panel
- Li-Ion battery

Drone installation



Gateway and weather station

- Continuous communication between sensor and gateway, weather station and gateway
- Collected data stored on secured online platform

Weather station

- Speed and wind direction, turbulence
- Ambient temperature
- Ambient pressure

Full energy autonomous

- Solar Panel installed on tower
- Rechargeable battery



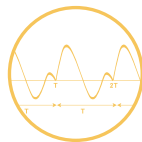
Data analysis

From real data measured to estimated lifespan of conductor



Raw data

- Time domain (s)
- Acceleration
- Amplitude
- Wind speed
- Frequency 10



Fast fourier transform

- Frequency domain (Hz)
- Deformation (μ strain)
- Fymax (mm/s)
- Displacement



Fatigue analysis

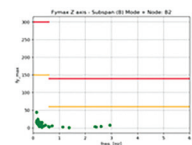
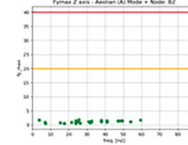
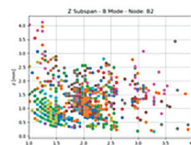
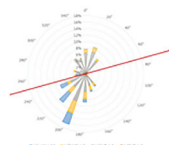
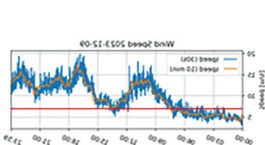
- S-N Fatigue curve
- Estimated lifespan of conductor

Complete monitoring and supervision in online platform

An easy to use platform is available to access in real time to the measurement and all graphics from analysis. It allows also the automatic generation of a full month Analysis Report. Alerts can be define in order to alert the client/user for unexpected event.

- Sensor data (Battery voltage, level of communication)
- Meteorological data (Wind and speed direction, ambient temperature and pressure, wind rose)
- Mechanical analysis data for each vibration phenomena
 - Fymax (mm/s)
 - Deformation (μ strain)
 - Displacement (mm)
 - Predefined limit for fatigue criteria
- Fatigue analysis
 - S-N Curve
 - Estimated lifespan of conductor
- DLR Data (Temperature and current of conductor)

Technical data		
Dimensions	Sensor	132 x 98 x 135 mm 0,700 kg
	Gateway	250 x 1100 x 500 mm
Power technology	Sensor	Self powered Li-Ion battery with 2 integrated solar panel
	Gateway	Self powered battery with solar panel
Application field	Diameter conductor range	From \varnothing 15 to \varnothing 50mm
	Operating temperature	Ambient : -40°C to +85°C, Conductor : -40°C to +250°C
	Environment	For single and bundle conductor in high voltage environment
Communication	Sensor	BLE
	Gateway	4G/Satellite
Sensor technology	Acquisition data	Weather station, 3D accelerometer, Surface temperature and Current



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