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CABLE MONITORING

Vincent Le Cam, Frédéric Bourquin

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CABLE MONITORING

Break detection & localisation by acoustic sensors

In view of safety, structure durability and cost efficiency, detection of wire breaks is a strategic component of cable monitoring. Knowing the number of breaks and their location contributes to understand the health of the structure. Acoustic emission emerges as one of the favourite non-destructive evaluation technique. LCPC develops wire and wireless acoustic sensors that provide a reliable cable health monitoring.

Localisation principle

Detection is possible by means of 3 acoustic sensors labelled 1, 2, 3 according to the time of arrival of the wave generated by the break. Sensors 1 and 2 receive the wave first. Break occurred between sensors 1 and 2. The wave speed is computed as :

$$V = L_{31} / \Delta t_{31}$$

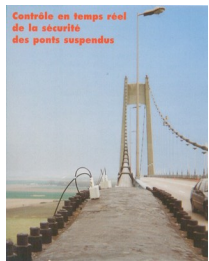
and the distance between the break location and sensor 1
Writes :

$$X = \frac{1}{2} * (L_{12} - V * \Delta t_{12})$$

where Δt_{jk} denotes the difference between the time of arrival at sensors j and k.

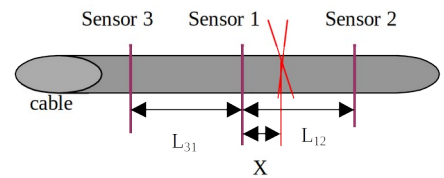
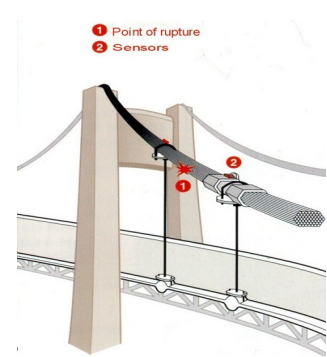
Applications

- Sensors are 10 m equispaced
- Ruptures are detected with an accuracy of +/- 15 cm
- The system provides alarms to bridge operator and successfully predicted critical health of bridges in service



Monitoring of Tancarville and Iseron bridges

Detection principle



Wireless platform



Wifi Sensor



Supervisor

New developments

New **wireless sensor network**, based on DSP and the emerging TCP/IP wireless protocol : WIFI

Enabled functionalities

- Accept heterogeneous measured data
- Record the full signal signature when wire breaks occur
- Organise the monitoring in an event-driven process

Vincent Le CAM (vincent.le-cam@lcpc.fr)

Laboratoire Central des Ponts et Chaussées

France