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THE NEWSLETTER

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CONTROL OF BIMETALLIC CONDUCTORS

CONDUCTOR ALU -STEEL

Introduction

Aluminum Steel cable is an element compound steel core (mechanical resistance) and an aluminum contour (Conductor). Strands of steel core are protected by zinc coating of 80µ thickness.

Problem

Aluminum / Steel cable is an aging element under the effect:

- Climatic attacks
- Mechanical stresses
- Low zinc composition (electrolytic)

Under the effect of an electrolytic phenomenon, this zinc protection is gradually dissolved, bare steel corrodes and leads to rapid disappearance of aluminum.

Consequence

In the presence of corrosion, aluminum is oxidized,
→ the conductive section decreases,
→ the temperature rises locally (transit of electricity in steel, high current density in aluminum)
→ increase of the phenomenon until the rupture.

The presence of corrosion accelerates the end of life at an almost exponential rate, the replacement in this case should be finalized quickly given the deadlines.

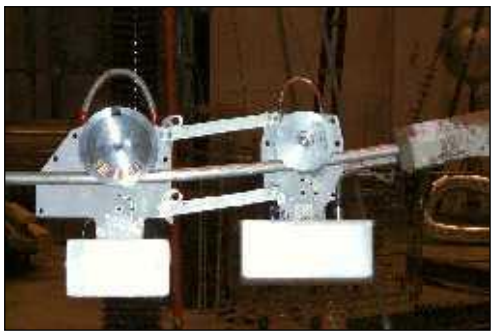
Principle

The OHLCD SHANNON device allows the control of bimetallic cables of all sections, whether they are line conductors or ground wires.

SHANNON DEVICE

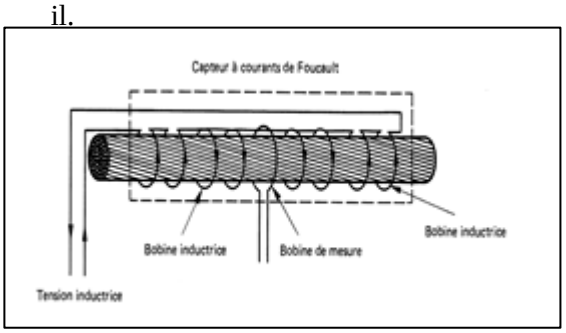
The apparatus is constituted of:

- A current sensor of Foucault composed on the one hand of two half cylinders encircling the cable to be checked and on the other, of a double induction coil and a measuring coil.



Motor Acquisition Solenoid

- An electronic system which allows of the induction coil feeding and measuring the voltage induced in the measuring coil.



Principle of the currents of Foucault

Sampling

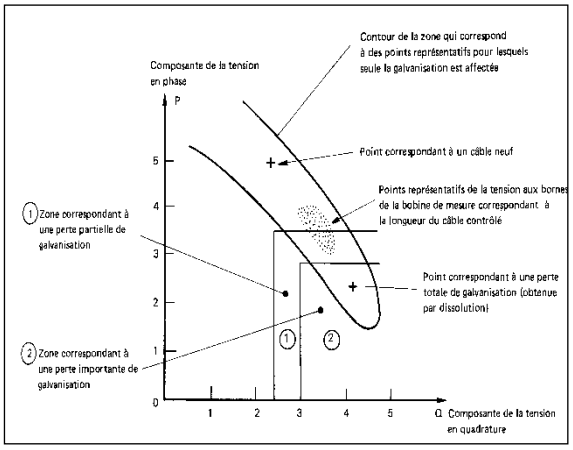
We must proceed step by step to choose the measurement points.
We must consider:

- The age of the cable (Minimum 30 years),
- History (pollution, saline atmosphere, the load in the line, the manufacturer),
- Sensitive or risky areas, (roads, SNCF, or public places).

The measurement is recommended on 5 to 10% of the length of structure. This measurement can be done on the two staves framing the support and always by alternating the appraised phases.

Calibration

A calibration of device is necessary, this is carried out over length of new conductor of the same section.



Calibration graph

The diagnosis

Recorded by range, and analysis on the whole line, the residual thickness of zinc measured makes it possible to estimate the residual life: 10 or even 20 years.

In the field

Installation of the device under voltage

Realized in conventional work or under voltage, The intervention requires the presence of the lines team for placing the device on the conductor. An operator follows the device throughout the range, the second records the telemetry.
the device is self-propelled and the measurements are transmitted by radio, this makes it possible to control the reception of data in real time.

The duration of the intervention

It is linked to the speed of movements of the means implemented because the test itself takes less than 20 minutes per range.
About 8 ranges are possible during the day.

Gain

Control of bimetallic conductor Almelec-Steel or Aluminum-Steel allows predictive replacement management, by optimizing the lifetime of these conductors.

Difficulties

The difficulties encountered are:

- Time (under voltage)
- Access
- The presence of an inconspicuous sleeve