

## Debate at CIGRÉ 2008 Optimisation strategies and tools for existing grids

A significant fraction of transmission grids of larger size and in more industrialized countries are reaching or have reached the end of their useful lifecycles approx. 50 to 60 years. Simultaneously, consumer demand continues to grow which requires an increase in grid capacity.

The easiest solution is the substitution of the lines that are at the end of their lifecycle for new ones of greater capacity along neighbouring tracks: the 150 kV line in the image was substituted by two 400 kV lines. This solution, however, is not always possible and is becoming increasingly rare. Engineers continue to study alternatives and these were debated at the Study Committee B2 at CIGRÉ:

⇒ methods to define life expectancy: stochastic algorithms grouped under "risk based condition management" that are used to estimate the amount of time until the reduction in quality dictates that the line must be abandoned or renovated.

⇒ diagnostic methods that provide greater insight into the state of the lines in service and then extrapolate these to other operational conditions and use support tools in maintenance and repair. This topic was the subject of laboratory reports, new sensors and meteorological forecasts. Albatroz Engineering's Power Line Maintenance Inspection (PLMI) system can be of great value in this area.

⇒ component state variables: result from incident analysis, laboratory tests at the end of the component lifecycle, inspection reports, and maintenance interventions that are considered in determining remaining life expectancy. The debate focused on the best way to transform the experimental data into critical variables in determining the state of the line. Article [1] presented by Albatroz Engineering and Labelec proposes a strategy based on geographic information systems and data bases.

With more representative variables and better diagnostic methods, exploration optimisation of active elements in the grid is more effective, increasing the life expectancy of the grids and supporting maintenance and renovation programs (Figure 1). The methods discussed include:

⇒ advanced rating methods were popular discussion themes and offer significant gains through adaptation of safety margins and reliability to field conditions,

⇒ substitution of line elements: low-sag conductors, bundled conductors, higher towers, multiple ground conductors etc,

⇒ substitute alternating current (AC) lines with direct current (DC) lines,

⇒ economic and environmental analysis of projects aimed at increasing load capacity.

[1] J. Gomes-Mota<sup>1</sup>, Miguel Ramos<sup>1</sup>, A. Matos-André<sup>2</sup>, "Geographical Information Tools for Overhead Lines Preventive Maintenance", <sup>1</sup>Albatroz Engenharia SA, <sup>2</sup>Labelec SA, CIGRÉ'08.



Figure 1 - Substitution of insulator chains in a 400kV line



## Albatroz Engineering at CIGRÉ 2008 Technical Exhibition

The stand at CIGRÉ 2008 was designed to reflect the field experience that Albatroz Engenharia has accumulated since 2006 with the Power Line Maintenance Inspection (PLMI) solution (Figura 2).

Since 2006, 4000km of very high voltage (VHV, above 100kV) and 2500 km of high voltage (HV, between 50kV and 100kV) have been inspected. General use in medium voltage (MV, below 50kV) is expected in 2009.

The stand presentation focused on PLMI simulator in real time that permitted visitors to enact the process of inspecting 60kV, 150kV and 400 kV on board the helicopter, by activating geo-referenced markers corresponding to faults encountered during the inspection.

The simulator embodied the innovative LiDAR distance measurement solutions with other inspections distinguishing several key characteristics of the PLMI solution:

- ✓ integration of all inspections: video, thermography, clearance with LiDAR and corona effect in a single flight,
- ✓ flexibility in adapting to equipment, processes and information systems already in use for inspections,
- ✓ fault detection in real time.

Responding to the needs of the electrical companies, Albatroz Engineering has extended the same concept to inspections performed from the ground (Figure 3), making it the first company to provide solutions for all environments using the same integration, flexibility and real time criteria.

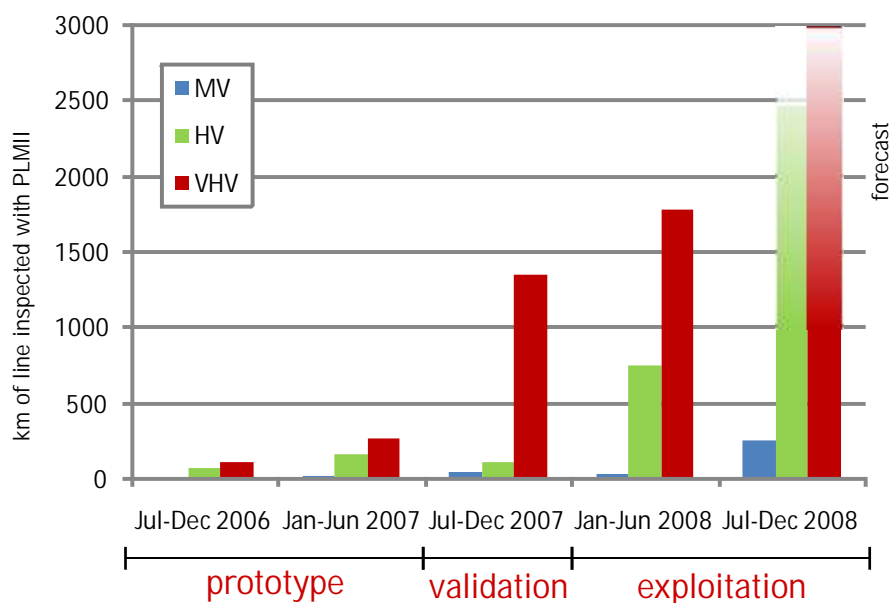


Figure 2 - Lines inspected since the start of the PLMI development. During the second semester of the first year (2007), a prototype was subjected to an intense validation process by the client (labelec, edp group). The solution began to be commercially explored in 2008 having inspected 6500 km of power lines; forecasts indicate 10000 km by the end of the year.

