PO. ID 417

How to use existing power lines to evacuate twice as much wind power ?

Huu-Minh Nguyen (University of Liège, Belgium) , Jean-Jacques LAMBIN (ELIA) and Jean-Louis Lilien (Ampacimon SA)

Ampacimon Overhead Line Monitoring

Online sag and ampacity monitoring by vibration analysis

The ampacity of a conductor is that current which will meet the design, security and safety criteria line on which the conductor is used. Actual ambient conditions are less constraining 98% of the time than those envisaged in the standards.

In order to reach the European mains 20 20 20, it has become necessary for each country to promote the installation of renewable production units. For some countries wind energy is now the main means to produce important quantities of renewable energy. Wind farm are growing but with the existing infrastructure and the exploitation norms currently valid, several of those plants could not be connected to the grid. Reinforcements, mainly of the High Voltage overhead lines, would be necessary to be able to accept those new injections. But reinforcement of an overhead line is a very long procedure with multiple issues like administrative obligations, local opposition to any action on the lines.

In operational exploitation, for security reasons TSO's can't allow that the flows (current) in the lines exceed the static rating. This rating depends on the line's thermal limit based on potential peak power evacuation during unfavorable weather conditions. This static rating is a conservative value that often leads to higher security margins than needed. Indeed, wind blowing over overhead lines is assumed to increase significantly these lines capacity, research of correlation between wind blowing in wind farms and the wind blowing over the overhead lines is ongoing.
To obtain a more efficient use of transmission lines, by reducing the existing margins while keeping a safe exploitation of the grid, it is necessary to know in real time the exact capacity of the involved lines.

Measurement / Processing / Communication system

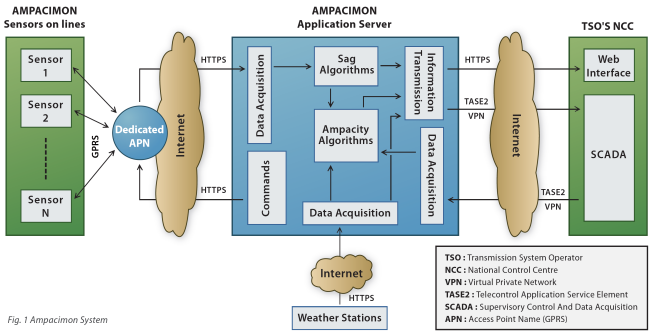
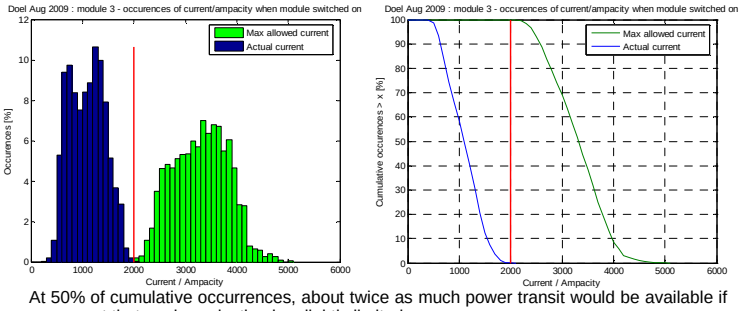


Fig. 1 Ampacimon System

System assets :

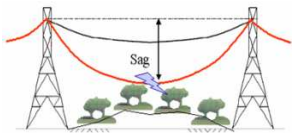
- Energetically autonomous
- Real time device based on vibration analysis
- Can be installed everywhere along the span
- No need of calibration in relation with the line to get the sag
- No need of environmental data to get the sag
- Easy installation in roughly 15 minutes
- Provides sag values and ampacity

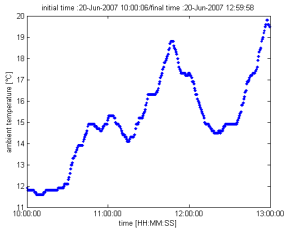
Results



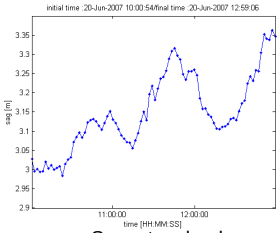
At 50% of cumulative occurrences, about twice as much power transit would be available if we accept that peak production be slightly limited.

Data processing

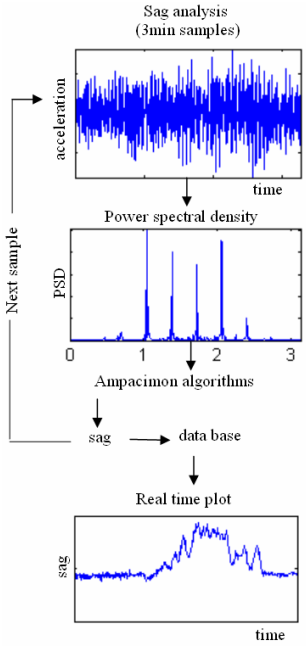




Temperature at no load

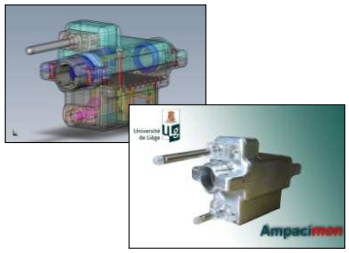


Sag at no load



Installation cases

Ampacimon unit (380 kV, Doel-Zandvliet, BE) ; ELIA, running system from July 2008.



CAD view and actual view of an *Ampacimon* unit, 2010.

Ampacimon during heavy rain corona test at "Les Renardières" (France).

Ampacimon live line installation (220 kV) RTE network. Running system form June 2009.