

# MEASUREMENTS ALLOW VERIFY THE ACTUAL OPERATION CONDITIONS

## CASE STUDY 9: DIELECTRIC MEASUREMENT IN A WIND FARM

By measurements, the actual operation conditions to which a series of transformers was subjected, has been verified. This helped to demonstrate that the technical specification of the transformers were not appropriate to the real environment in which they should operate.

### SUMMARY

After relatively little time being installed, a significant number of tower transformers have suffered failures. Initially these faults seemed to have no justification apart of a defect of production or design of the transformers, as for example, the current flow was almost always less than nominal.

**Measurement campaign shows an enormous amount of different types of transients, starting from intermittent ground faults to switching overvoltages, with the constant emergence of voltage notch. Analyzing the transformers Technical Specification, it was verified that there were no description of the special conditions of operation which were subjected of the transformers!**

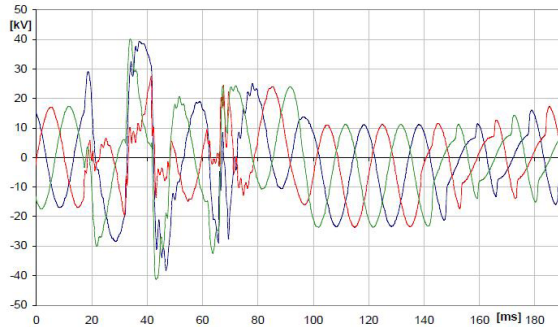
### DESCRIPTION

In a wind farm, where a large number of transformers suffered some failures, two networks analyzers were installed, one in the medium voltage side and the other at low voltage side of one of the towers.

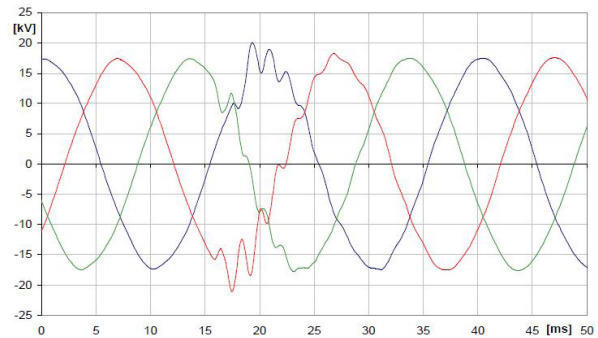
### TECHNICAL CHALLENGE

- Correct set of electrical quantities to be monitored.
- Due to the low GSM signal, an amplifier antenna for remote reading had to be installed.
- Select a representative tower of the electrical phenomena.

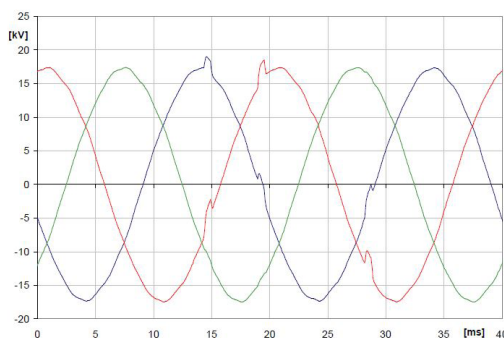
### RESULTS



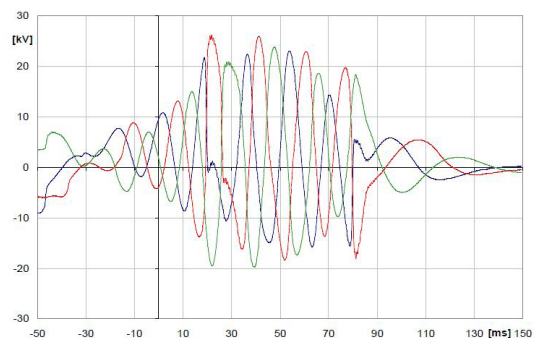
intermittent fault to ground



Switching overvoltages



Repetitive voltage notching



Phenomenon comparable to ferroresonance

Intermittent failures to ground, switching overvoltage, repetitive notching and phenomena that can be interpreted as ferroresonance were observed.

### CONCLUSIONS

The measurements campaign allowed to verify that the transformers technical specification was not appropriate to the actual operation to which they were subjected.