

## Simulations allow to prevent expensive faults

Through simulations, it was verified that the phenomenon of arc reignition appears during the opening process of a no-load current of an arc furnace transformer. RC filters were dimensioned and the arresters were selected.

## Case Study no. 8: Dimensioning of RC filters for the elimination re-ignition phenomenon of the arc in the vacuum circuit-breaker

### 1. Summary

The frequency range and amplitudes of switching transients depend on several aspects, like layout of supply system, cable lengths, bus-bar lengths, operation of arc furnace, etc.

*While the arresters selection is made on the basis of a consolidated procedure, the design of RC dampers is carried out by the help of digital models. Thanks to the simulations, the optimum design of RC filters was made, eliminating the possible restrikes!*

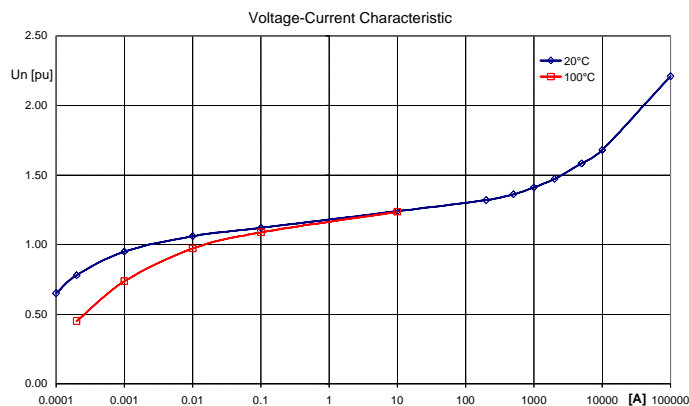
### 2. Description

Selection of arresters and design of RC filters.

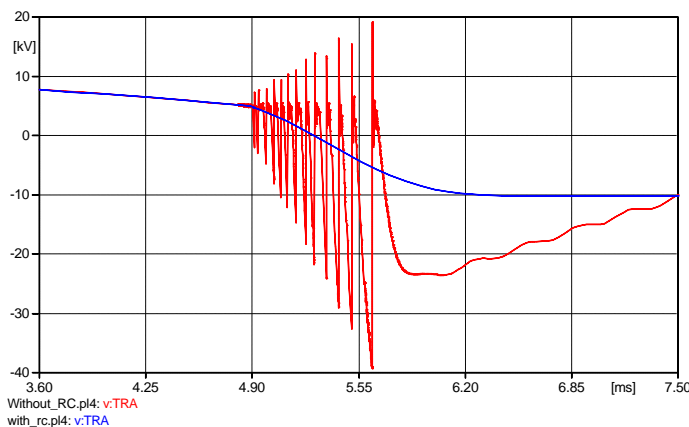
### 3. Technical challenge

- Correct simulation of the different apparatus in the frequencies range of interest.
- Proper model of the vacuum circuit-breaker characteristics.

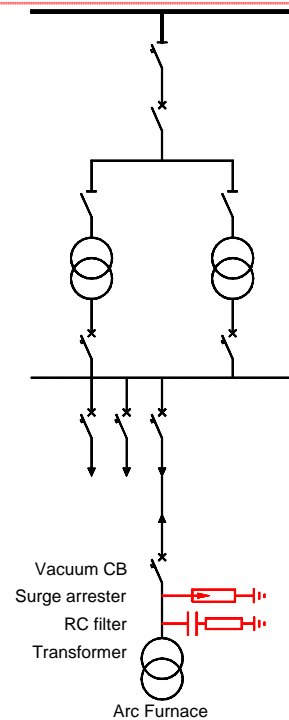
### 4. Results



u-i arrester characteristic



Overvoltage with and without RC filters



One-line diagram

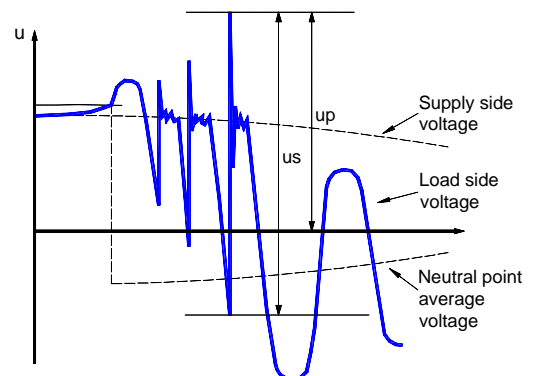


Illustration of transient voltage

The arrangement of surge arresters and the optimum dimensioning of RC filters allow obtaining a correct protection of the transformer.

### 5. Conclusions

The simulations permitted the correct dimensioning of RC filters with the result of complete restrike elimination in the vacuum circuit-breakers.