Simulations to verify projects

The simulations allowed us to detect the incorrect sizing of the harmonics filter system in a new steel plant.

Case Study no. 10: Harmonic Load Flow

1. Summary

The project of a new steel plant, which should be installed directly to the transmission grid, comprises a 170MVA filter system. The transmission company requested a detailed study of electromagnetic compatibility and in particular about the harmonic load flow.

The result of the study shows that some individual voltage harmonics exceeded the emission limits. Thanks to the simulations the filtering system before the commissioning of the steel plant was improved!

2. Description

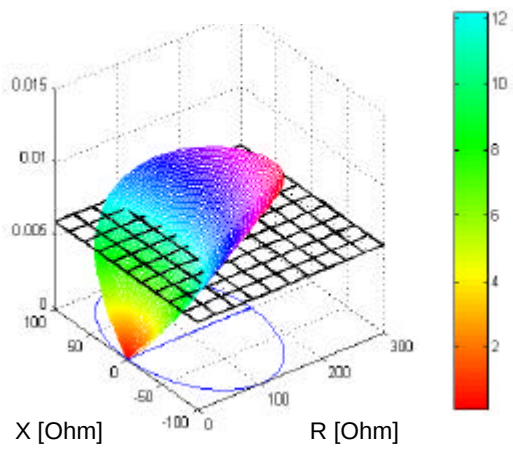
The steel plant consisted of an arc DC furnace of 130MVA (12 pulses) and a ladle furnace. The static compensation system included a set of filters for the harmonics damping.

3. Technical challenge

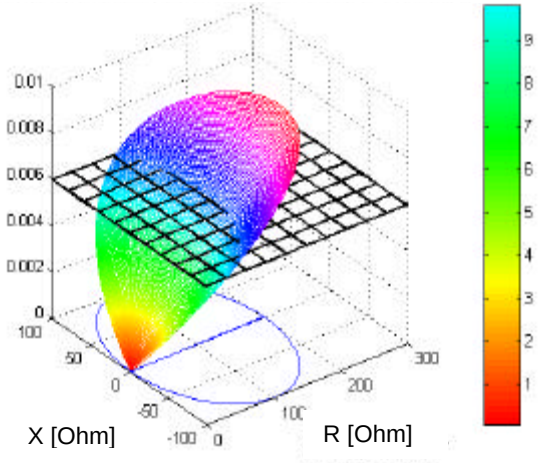
- Representation of the harmonic impedance of the external network.
- Correct modeling of the steel plant electrical components.

4. Results

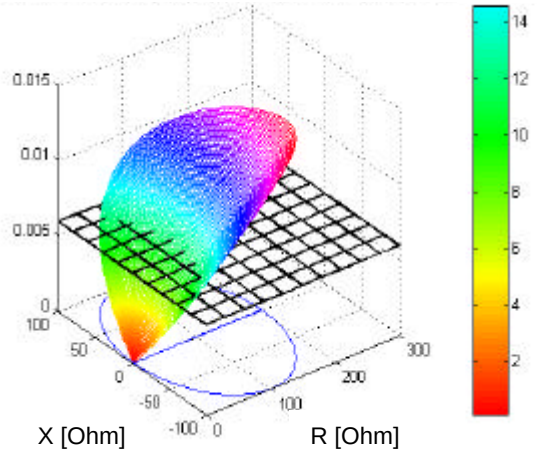
Individual harmonic distortion – V11



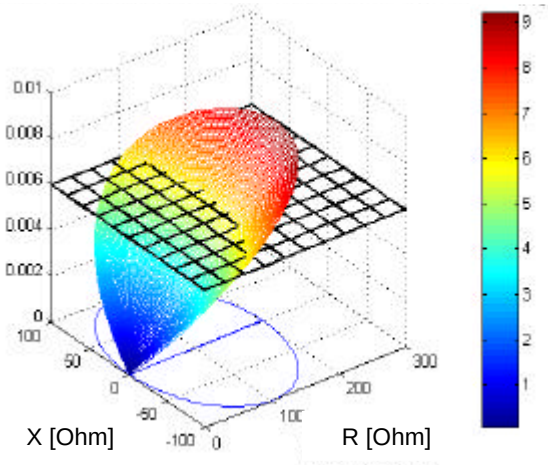
Individual harmonic distortion – V23



Individual harmonic distortion – V13



Individual harmonic distortion – V25



In some assets of the external network, the individual harmonic voltage of the harmonic order 11, 13, 23 and 25 exceeded the emission limit.

5. Conclusions

A completely new filtering system was designed in order to comply with the local Power Quality standards.