# SIMULATIONS PERMIT UPGRADE

## CASE STUDY 2: GSU TRANSFORMER UPGRADE - TANK HOT SPOT

Through simulation, tank hot spot areas are located, their formation is understood, effective solutions to prevent overheating are found and therefore the upgrading of the unit is possible.

### SUMMARY

Significant localized tank cover flange heating had been observed by infrared scan on a 185 MVA GSU transformer, compromising the aimed upgrading (by 23%) of the name plate MVA rating. The enhanced oil cooling could not cope with the localized tank hot spot.

**The simulation provided a good match with the measured tank temperatures.** Additional studies allowed the verification of alternative designs for the LV busbars enclosure.Thanks to the simulations the proper solution was identified!

### DESCRIPTION

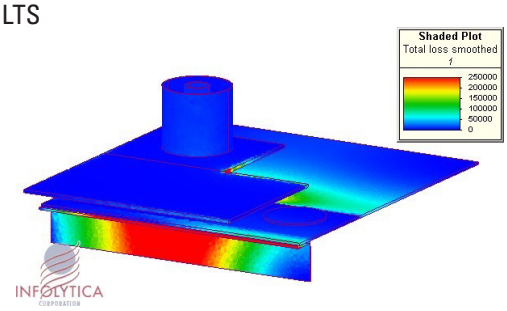
185 MVA single phase GSU transformer

Side view (shorting plate disassembled)

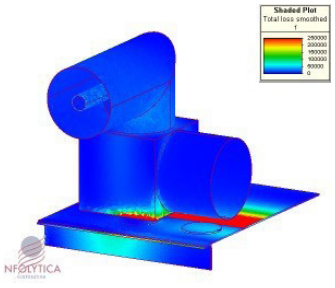
### TECHNICAL CHALLENGE

- Aluminium shields inside the tank, mild steel tank wall and non magnetic steel cover parts had to be taken into account
- A 3-dimensional modelling was necessary
- Close cooperation with the manufacturer of the enclosure and quick delivery of the simulations were a must in order to identify a solution in time for the scheduled maintenance of the power plant

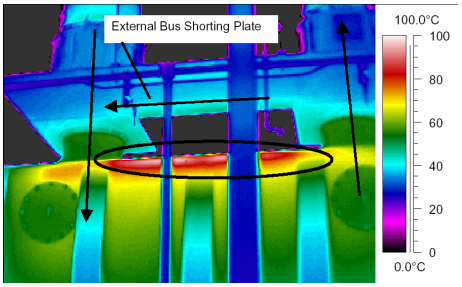
### RESULTS



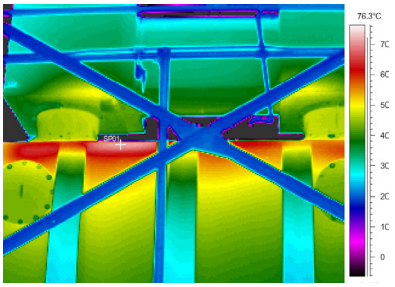

Specific losses (original enclosure)




Specific losses (new enclosure)




Temp. at 190 MVA, tank flange hot spot = 96 °C



Temp. at 228 MVA, tank flange hot spot = 72 °C

The solution was to move the crossover shorting plate to shift flux induced currents and losses from the tank cover flange to the middle of the tank cover.

### CONCLUSIONS

By means of simulations, together with the manufacturer of the enclosure, Weidmann Technology Services designed the optimized busbar enclosure which allowed the transformer upgrade from 185 MVA to 228 MVA.

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