

Finite Network Method

Precise simulation of EAF high current systems



Principles.

- Detailed simulation of all electro-magnetic properties of EAF high current system.
- Accurate calculation with a precision of less than 1 %; all other methods have error ranges >10%.
- Simulation also for peripheral and metallic structures where eddy currents are induced.
- Precise unsymmetry calculation as the basis for good operational results.
- Optimisation of existing equipment and optimal design of new equipment.

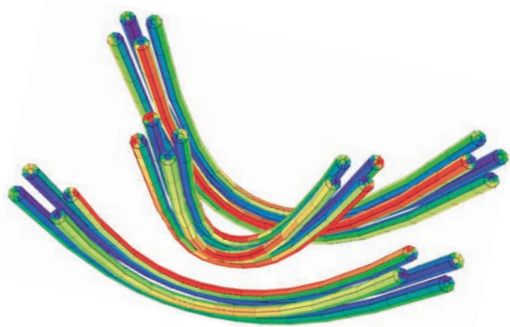
Concept.

Finite Network Method (FNM) makes realistic calculation feasible for the first time:

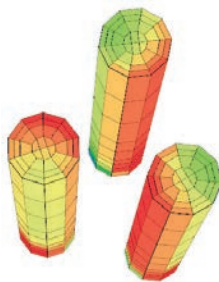
- Local current density.
- Exact short circuit impedance and unsymmetry; short circuit tests (dip tests) are not necessary any more.
- Real static and dynamic forces and momenta acting on the mechanical system.
- Local magnetic field strength and shielding effects.
- Induced eddy currents.
- Effects of ferromagnetic material like steel.

Advantages.

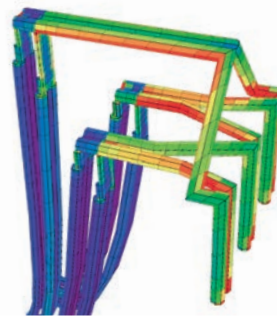
- Exact dimensioning of components and ultimate power input optimisation.
- Optimum layout of masts and roller guides for best power input.
- Optimal design of high current conductors and symmetrizing loops.
- Prevention of hot spots in the furnace.
- Balanced power input and improved regulating performance.
- Optimal material sizes, optimal cooling.



Inhomogeneous current density distribution in the high current cables depicted in a cross-section.



Simulation of graphite electrodes with clearly visible proximity- and skin-effect.



Very inhomogeneous current density distribution at the external delta closure of the transformer.

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