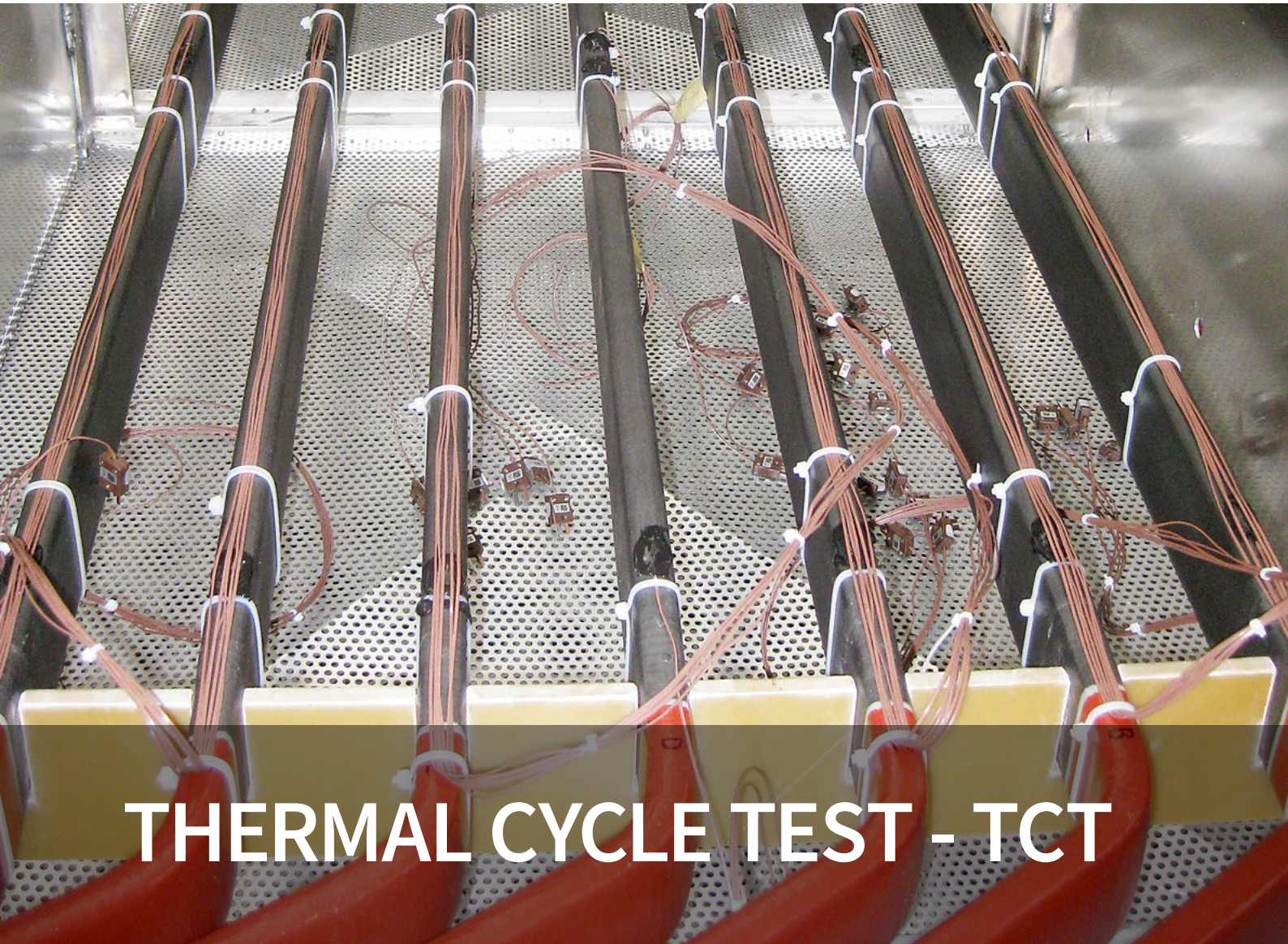


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THERMAL CYCLE TEST - TCT



Thermal cycle test - TCT

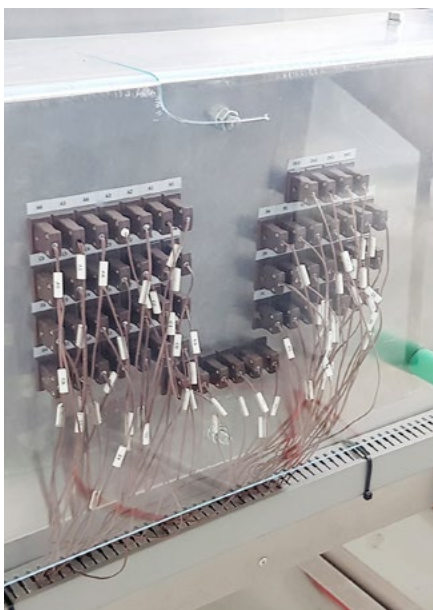
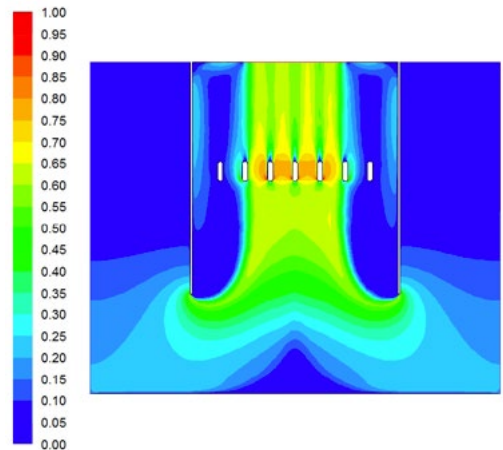
Machine winding is under constant thermo mechanical stress due to the intermittent operation of the machine. This is closely related to the expected winding lifetime and thus of great importance for the winding producers and users. Thermal cycling stresses can, to some extent, be replicated and accelerated in laboratory. Such thermal cycle tests (TCT) are performed to ascertain whether a new stator winding insulation system can handle intermittent operation, to evaluate the relative difference between different types of insulations or to investigate degradation processes and failure mechanisms.

TCT features:

- thermal cycle test according to the IEEE 1310 and IEC 60034
- modular chamber enables testing of various size windings
- detection of changes in the insulation system as a result of the thermo cycling test
- comprehensive report based on recorded data

Test on winding includes:

- five points dimensions measurement
- surface resistivity measurement
- dissipation factor and tip-up measurement
- measurement of the capacity
- partial discharge measurement
- tap test
- high voltage measurement

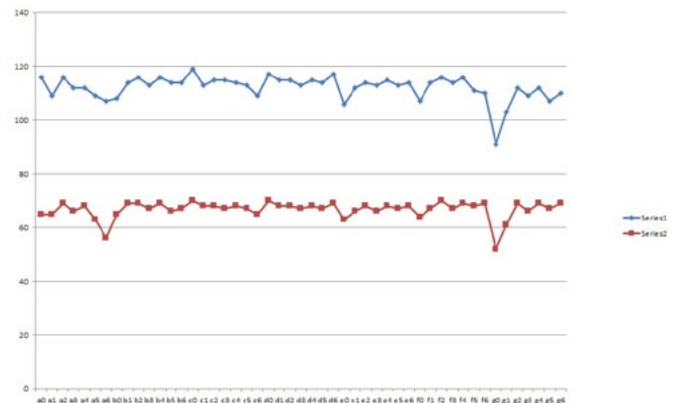
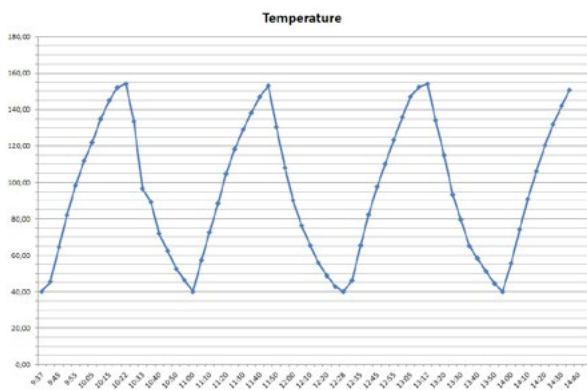




TCT specification

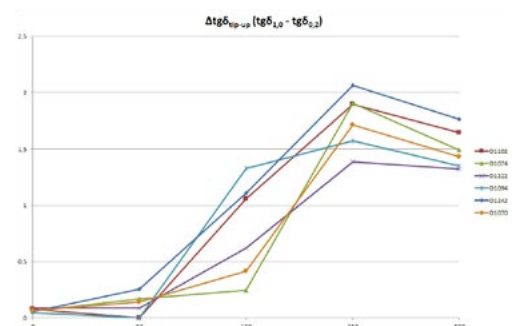
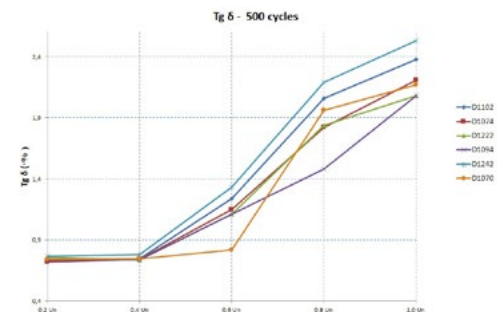
Configuration:

- modular aluminum chamber that can be configured according to the bar size (up to 4000 mm)
- simultaneously testing of four bars plus three additional bars for measurement accuracy assurance (one bar for temperature measurement and two additional bars for maintaining same condition for the testing bars).
- detailed CFD analysis of the flow inside the chamber ensured a uniform temperature distribution along the bar



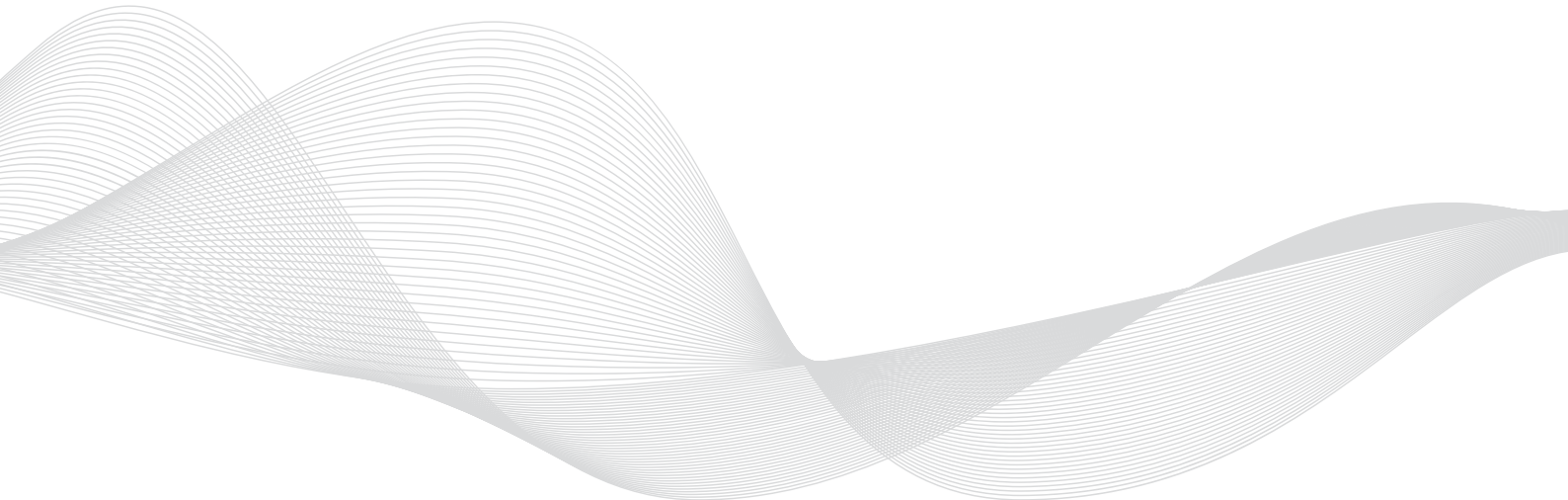
Features:

- testing according to the IEEE 1310 and IEC 60034
- the heating and cooling temperature range in a regulated chamber (40° C to UPR*)
- UPR (Upper Temperature Limit) is determined with bar insulation class
- the ability to change temperature speed increase and decrease (1,5 to 3,5 °C/min)
- temperature is controlled based on temperature measurement directly on copper of the reference bar
- regulated power source
- measurement system enables continuous measurement up to 50 temperatures and all process parameters during cycling
- all data measured during cycling are stored in database (data export enabled in .XLS format)

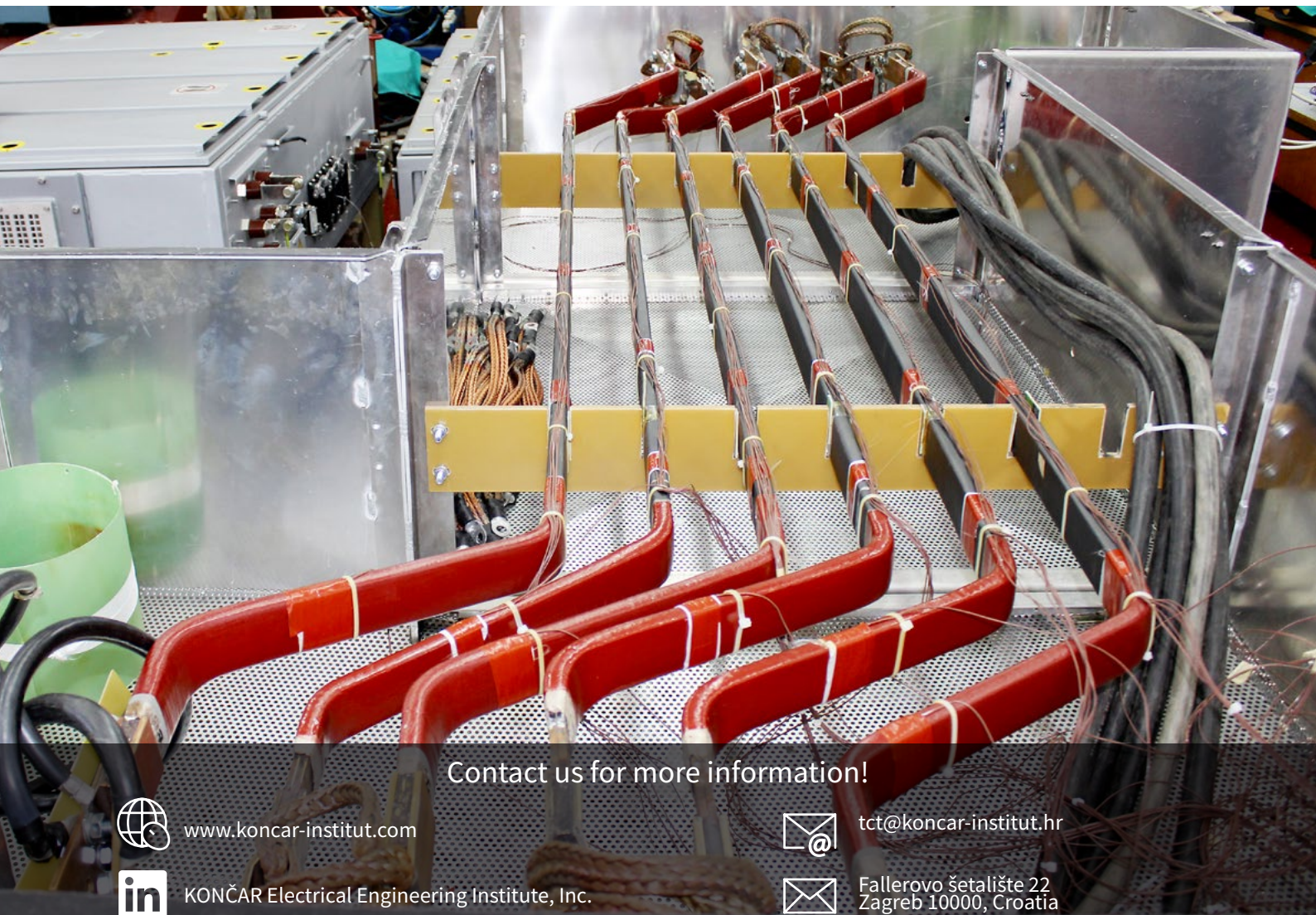


Additional info:

- bump test measurement on five positions on a bar including frequency response analysis
- high voltage measurement before and after cycling with voltage $1,17 \times (2U_n + 1000 \text{ V})$
- dimensions measurement with accuracy $\pm 0,025 \text{ mm}$



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