

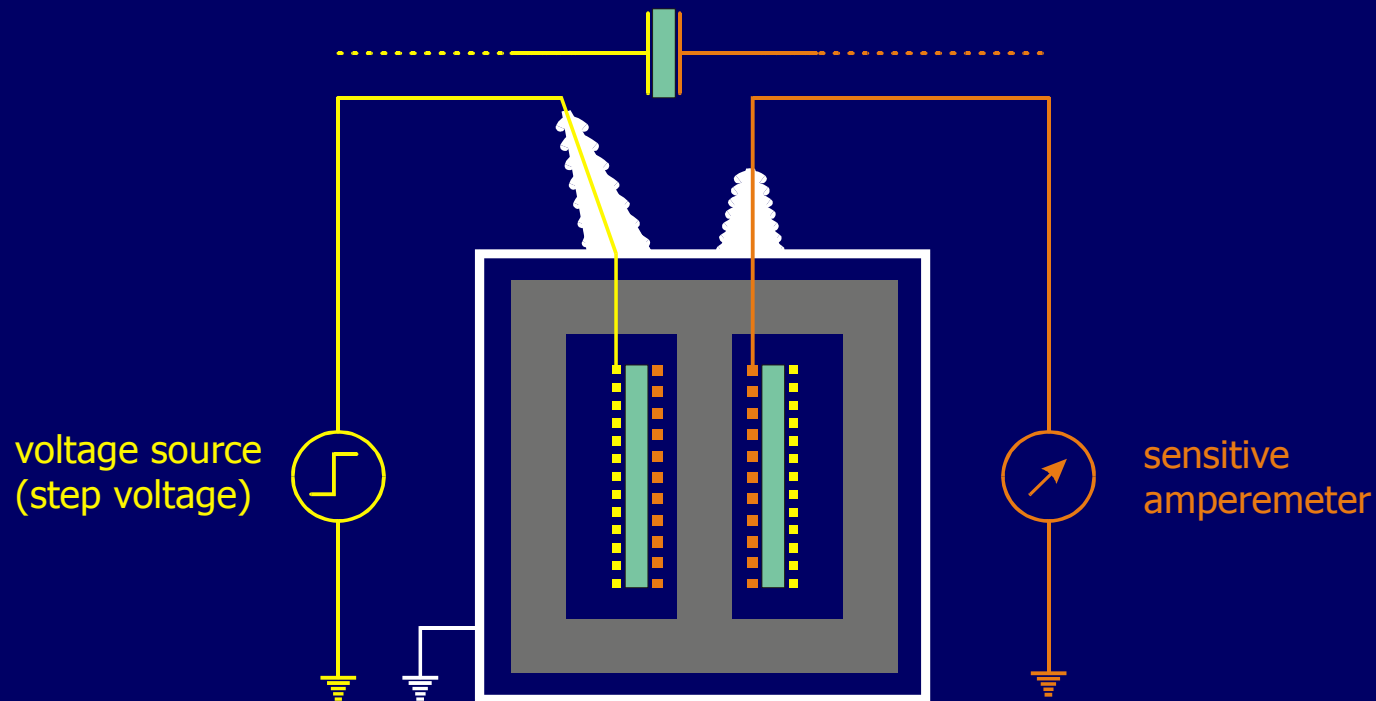
# PDC-ANALYSER-1MOD



Determination of the **moisture content** in the **pressboard**  
and of the **oil conductivity** in power transformers

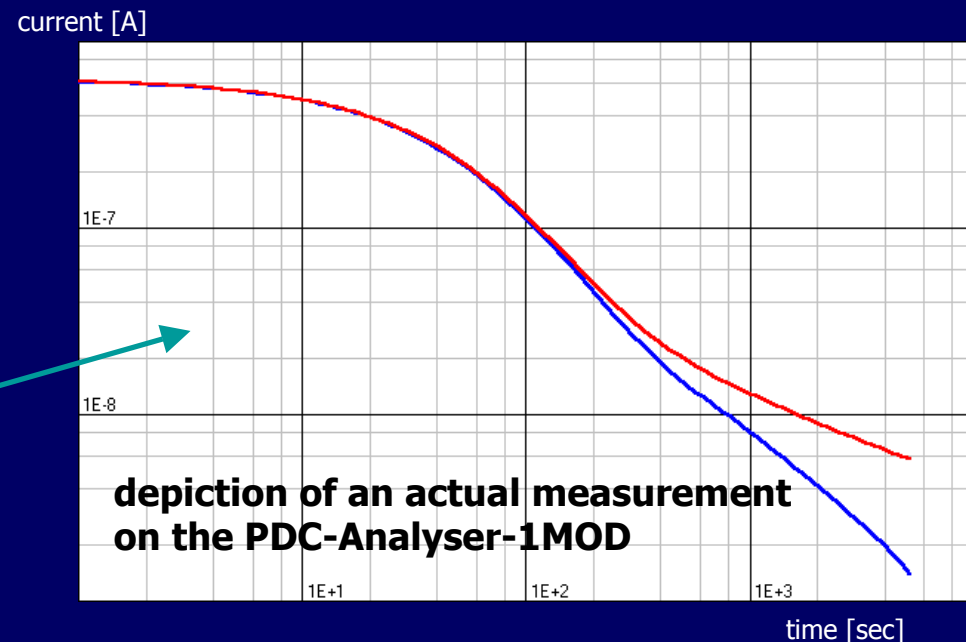
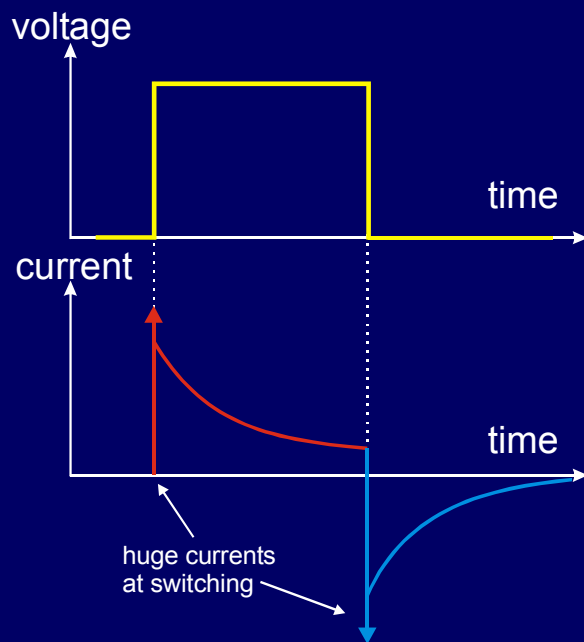
# Measuring Method (part 1)

- The insulation between two windings is a capacitor, the two windings are the electrodes
- A first winding is connected to a voltage source, a second winding is connected to a sensitive amperemeter.




# Measuring Method (part 2)

- Because of polarisation effects, tiny currents can be measured for long durations after the voltage is switched (for hours and days).
- One measurement consists normally of a set of two current curves: the polarisation current curve when applying the voltage and the depolarisation curve when switching back to zero volts.

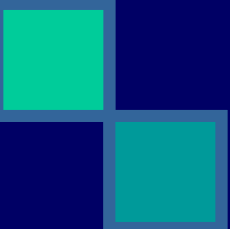



# PDC-ANALYSER-1MOD

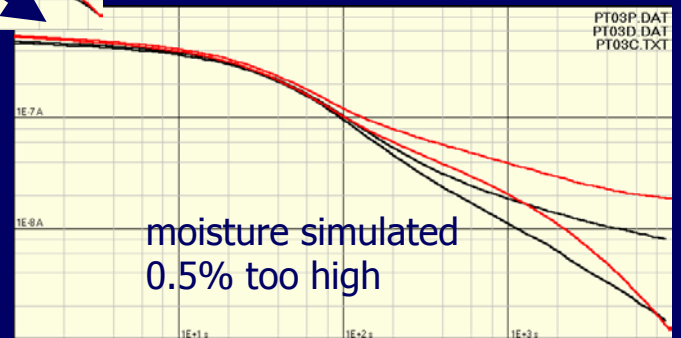
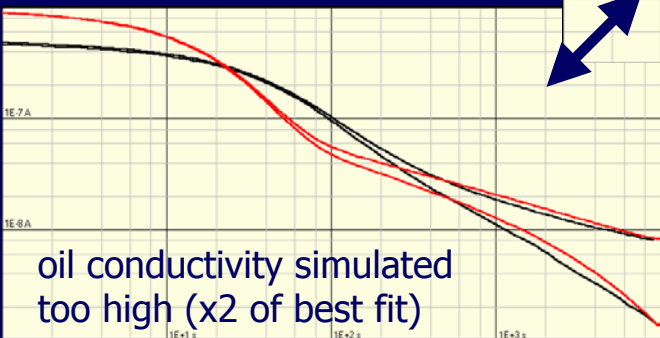
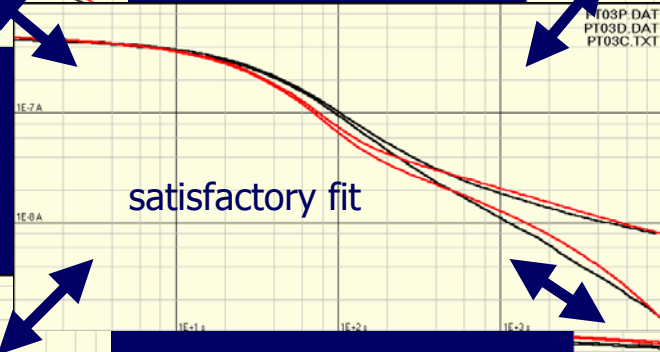
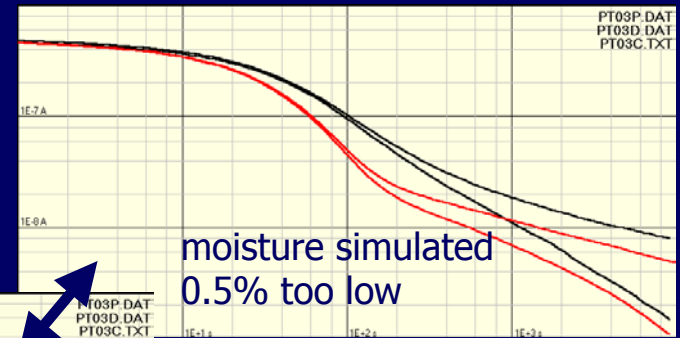
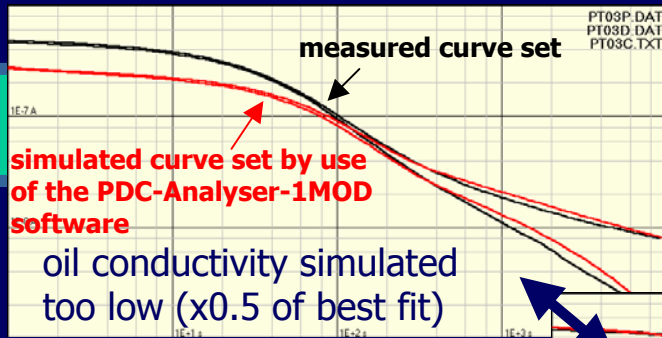




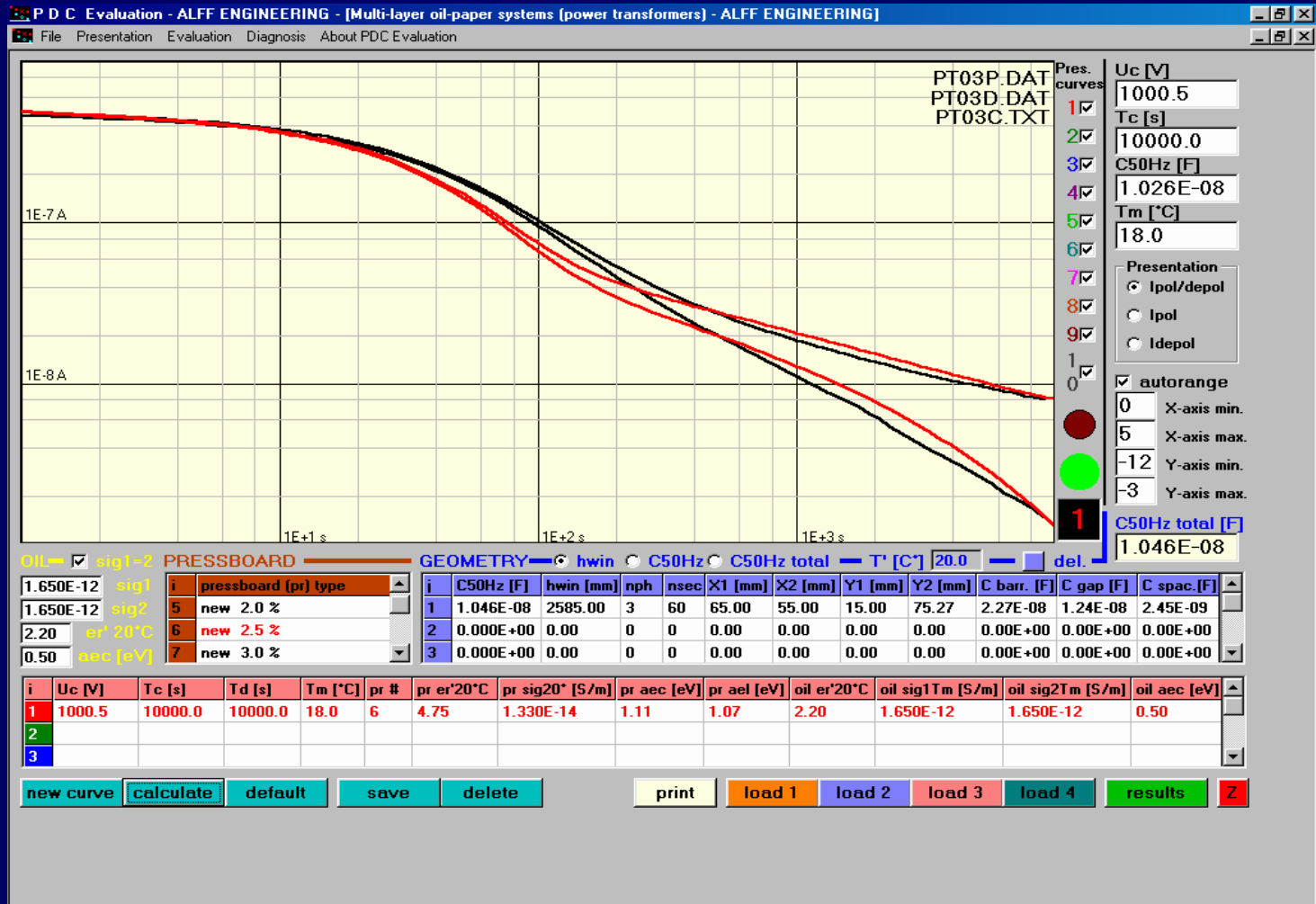
## Extracting information on moisture content in the pressboard and on oil conductivity from the measured currents

- In most power transformers, the main insulation has a layered structure (oil, barriers, spacers). The measured currents are shaped by the oil properties, by the pressboard properties and by the geometry of the structure.
  - Besides of being able to measure the currents on-site, the PDC-Analyser-1MOD has a build-in software for analysing these currents. In an iterative process, a best fit of simulated to measured currents yields the moisture content in the pressboard and the oil conductivity.
- 
- 

# The oil conductivity and the moisture in the pressboard shape the current curves at measurement times well apart

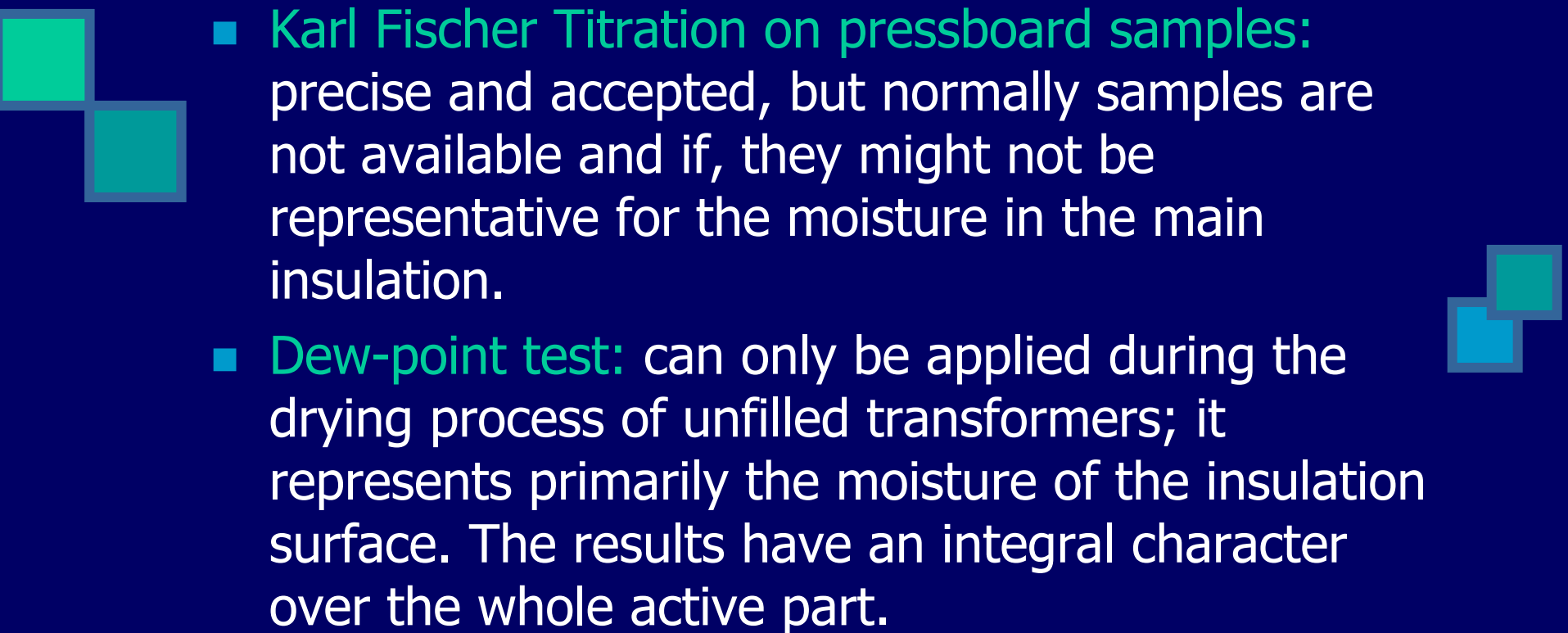


# Screenshot of the evaluation software used on the PDC-ANALYSER-1MOD





# Survey of methods for the determination of moisture content in pressboard (part1)

- **Karl Fischer Titration on pressboard samples:** precise and accepted, but normally samples are not available and if, they might not be representative for the moisture in the main insulation.
  - **Dew-point test:** can only be applied during the drying process of unfilled transformers; it represents primarily the moisture of the insulation surface. The results have an integral character over the whole active part.
- 



# Survey of methods for the determination of moisture content in pressboard (part2)

- **Moisture equilibrium curves oil/solid insulation:** can be used online, however time constants for obtaining equilibrium are extremely long and the actual equilibrium state of a transformer is not well known; this problem is most notorious at low temperatures. Yields an integral surface moisture value of the entire solid insulation.
- **Dielectric response:** PDC-Analyser-1MOD allows to determine selectively the bulk moisture in the barriers and spacers of the main insulation without opening transformers, any (constant) temperature during measurement is no worry. Off-line method.