

## Short-circuit Withstand modeling

*A2* Transformer

*PS3* Best Practices in procurement

*Q3.8* Numerical simulation to support short-circuit withstand

Jean-Christophe Riboud France

IEC 60076-5 MT Convenor

# Numerical simulation

- *IEC 60076-5 draft of future edition*
- Recognizes that numerical simulation does not cover all aspect (§6.2.1 of CD):
  - Relevance of the demonstration depends on the representativeness of the references.
  - Representativeness of the reference depends on
    - manufacturing skill
    - material properties
    - equipment used for manufacturing
  - Cleat and leads are usually not calculated



Group Discussion Meeting

# Numerical simulation

- *IEC 60076-5 draft of future edition*
- Recognizes that numerical simulation does not cover all aspect (§6.2.1 of CD):
  - The demonstration by calculation does not cover the dynamic behavior of components
    - Buchholz relay
    - pressure relief device and over pressure detection device,
    - bushings,
    - tap changers, its protection relay and its motor drive.
    - Insulating parts



# Numerical simulation

- *Improvement*

- Tolerances on impedance can be addressed in the reference transformer
- Balance of ampere turns centre can only be ensured by manufacturing procedures

- *Conclusion*

- Numerical simulation can't be enough to support short-circuit withstand
- Use of actually tested references is necessary