Paris Session 2022

Adapted insulation systems for transformers

Study Committee A2 PS1
Q1.1 What are design challenges for transformers installed in a nacelle with high range of vibration, shock, and special requirements?

DUART - Switzerland

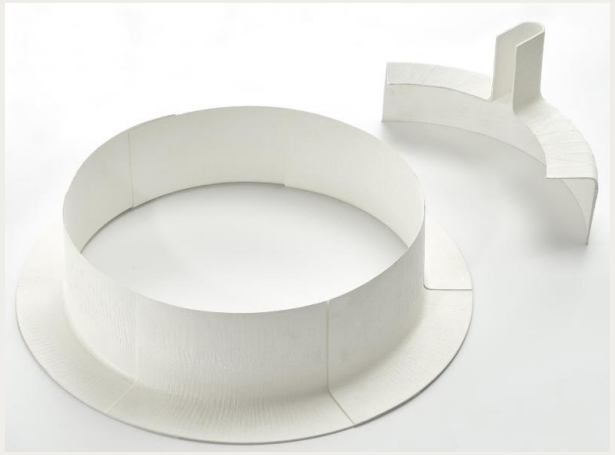
DUPONT

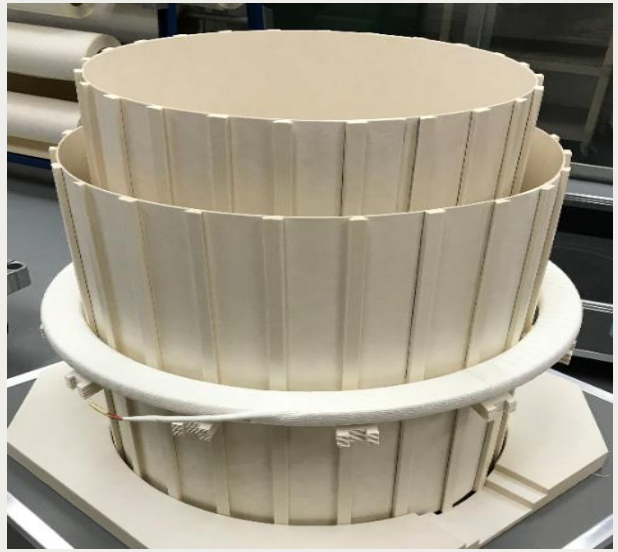
History in transformer development for wind turbines

- *Step up transformers for wind turbines*
  - 1980's – 1990's : Mineral oil filled transformers for turbines below 1 MW - Onshore
  - 2000's – 2010's : Ester filled transformer or CRT in the tower or in nacelle – Onshore and Offshore
  - Since 2010 voltage and power rating increase in offshore (up to 66kV, above 10 MVA) leads shifting towards fluid filled transformers mainly.

- *Alternative insulation systems for fluid filled transformers*
  - Combination of aramid based materials and ester fluids to allow for compactness and higher power density, longer life, long periods with high loadings,…

Alternative insulation components





- New molded components
- New heat formed components
- New paper for Diamond Dotting process

•Further requirements on next gen step-up transformers

- Higher voltage application :
  - 132 kV class,
  - design transition from layer to disc winding.

- Installation in floating offshore wind turbines
  - more vibration for components in nacelle
  - more abrasive resistance materials required

Aramid insulation often used for superior performance and longer life insurance

Thank you for your attention !