



# **DRAPABILITY EVALUATION OF ADHESIVE-BONDED NCF BY MEANS OF LOW-FIDELITY SIMULATION**

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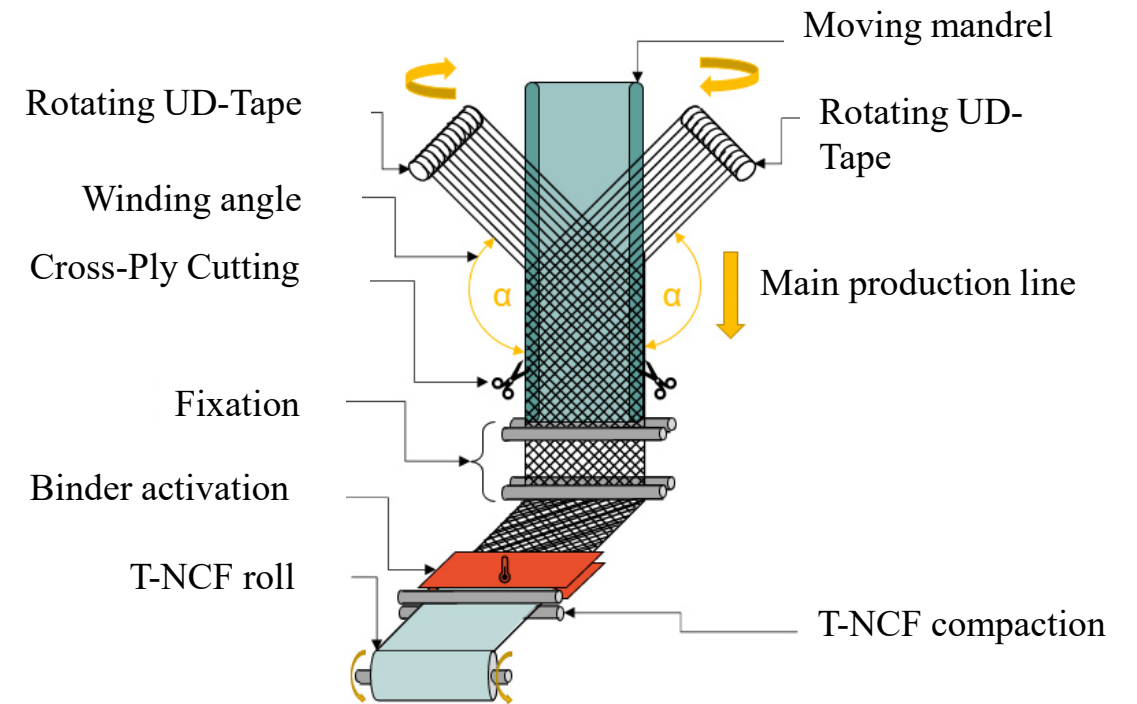
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# Motivation



- Large scale production series for tailored non-crimp fabrics (NCF)
  - Layer bonding achieved by in-line feeding of adhesive binder
  - Adhesive web binder added in layered form
  - Omission of stitching process
- Need for drapability characterization for **holistic process optimization**
  - Draping mechanisms
    - Material characterization
  - Low-fidelity approaches required



# Adhesive-bonded NCF



Thermoplastic grid to ensure integrity of layer

Backside of the UD-Layer without thermoplastic grid

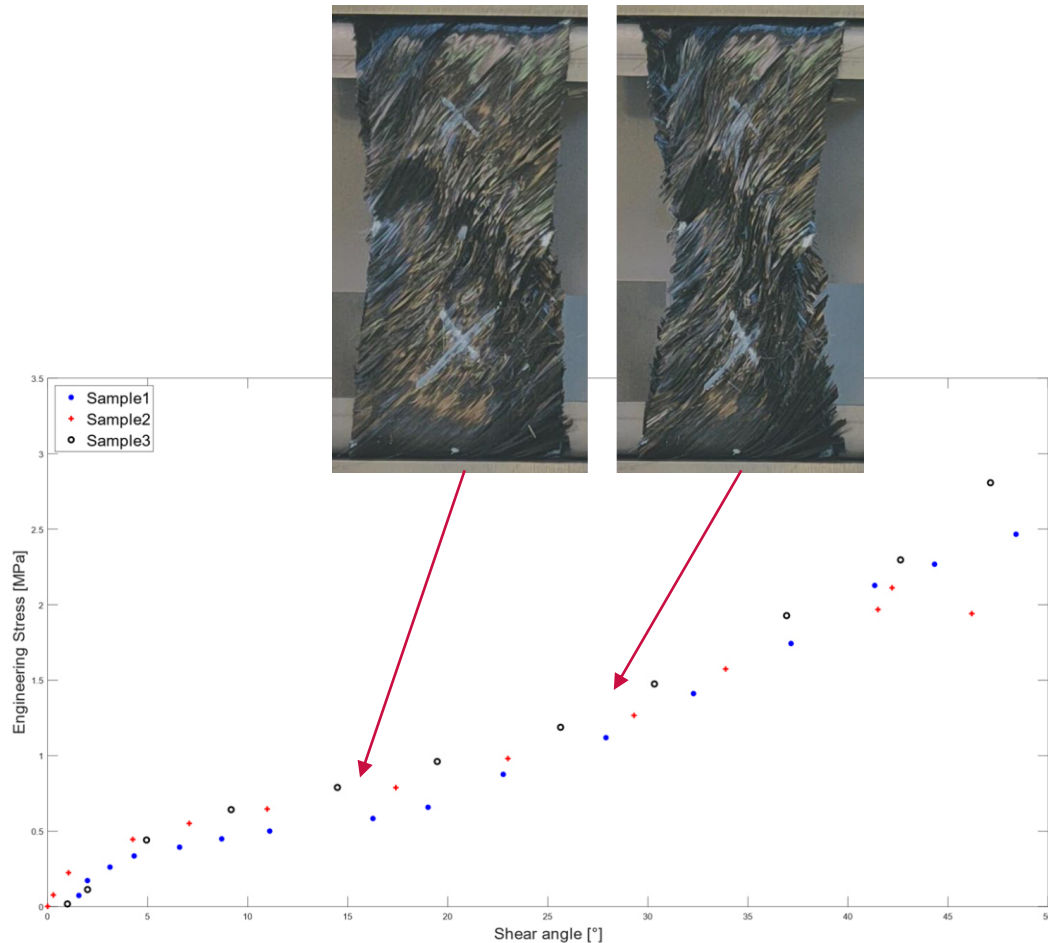
Thermoplastic adhesive web between two layers

UD-Layer, Panex PX 35, 80g/m<sup>2</sup>

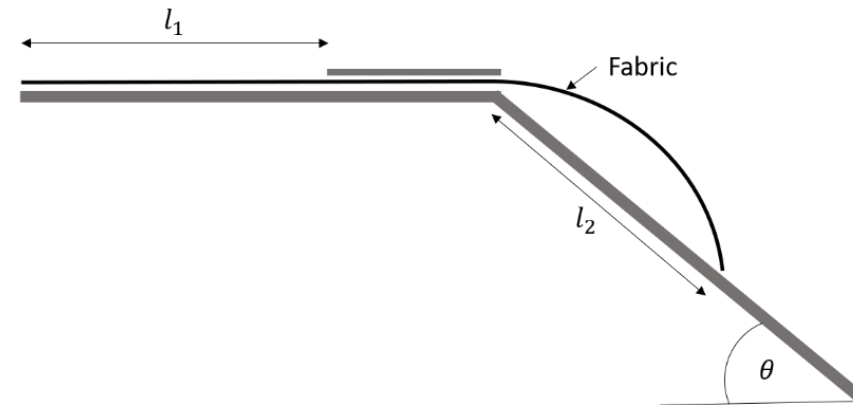
- **Forming mechanisms:**
  - Shearing and fibre slippage
  - Degree of slippage dependant on binder distribution
  - Rather high bending stiffness

# Material characterization

## Bias extension for shear stiffness



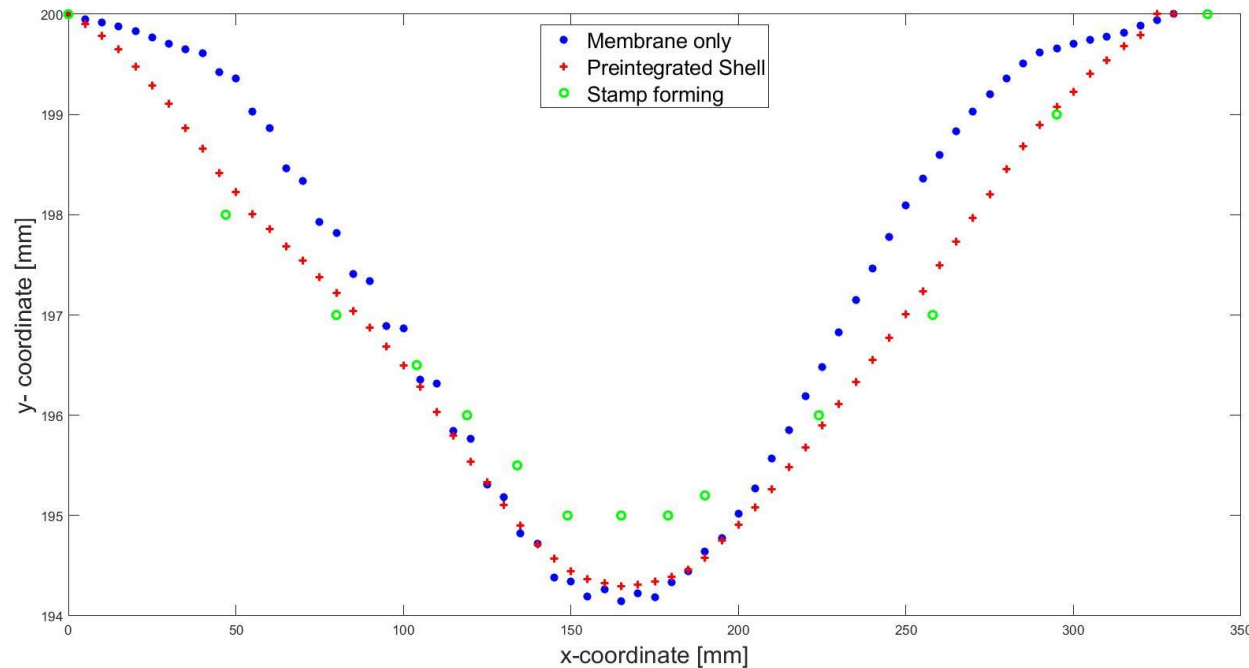
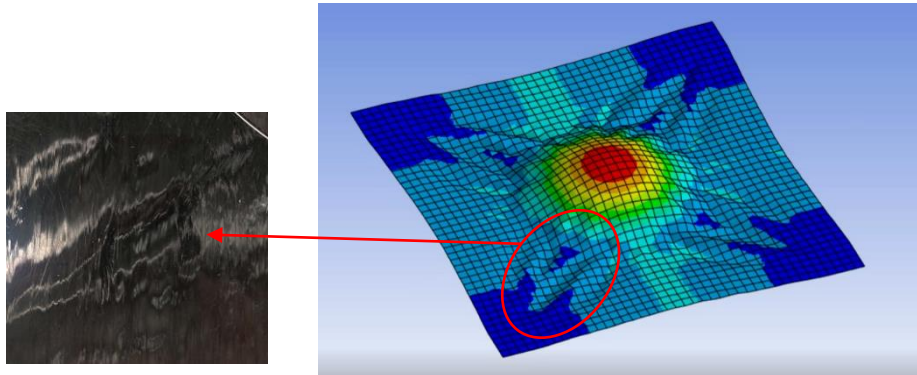
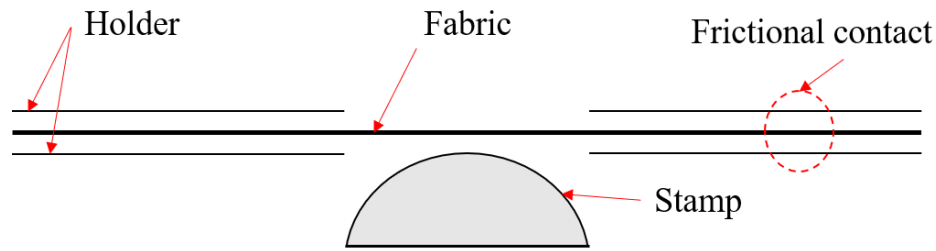
## Cantilever test for bending stiffness



- Study of influence of:
  - Binder quantity
  - Consolidation pressure
  - stacking-sequence

# Continuum Model FEM-Simulation

- Material data fed to FE-model
- Comparison between membrane, pre-integrated shell and experiment
- Comparison of draw-in behavior







# Thank you for your attention!

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**Are there any questions?**