

# Sustainable airlaid nonwovens – Development at VTT

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## Starting point

### Challenges

- Up to 70% of nonwovens made from oil-based materials
  - Spunbonding is the prevailing manufacturing method
  - Petroleum-based binders & binder fibers

### Development drivers

- Single-Use Plastics directive
- Rising environmental awareness
- Demand for sustainable materials

### Opportunities

- Novel textile fibers
- Emerging supply of alternative natural fibers

## Proposed approach – Airlaying

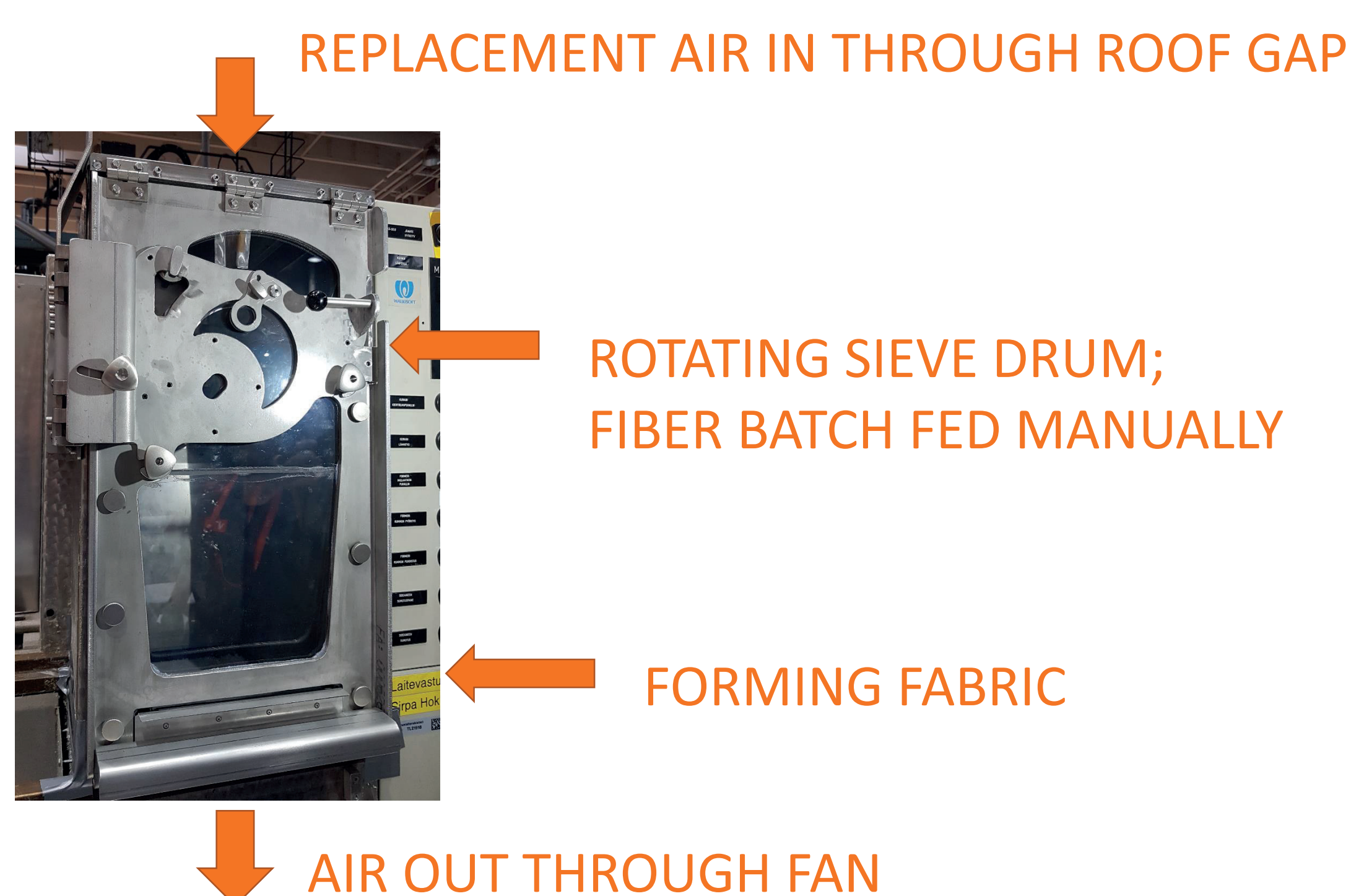
- Contains 70% to 85% of wood fibers (fluff pulp)
- Dry-processing method that saves water and energy
- A variety of raw materials can be processed

## Research goals at VTT

1. Increasing the bio-content of airlaids
2. Expanding raw material base
3. Developing novel thermoplastic airlaid composites

## Research facilities at VTT

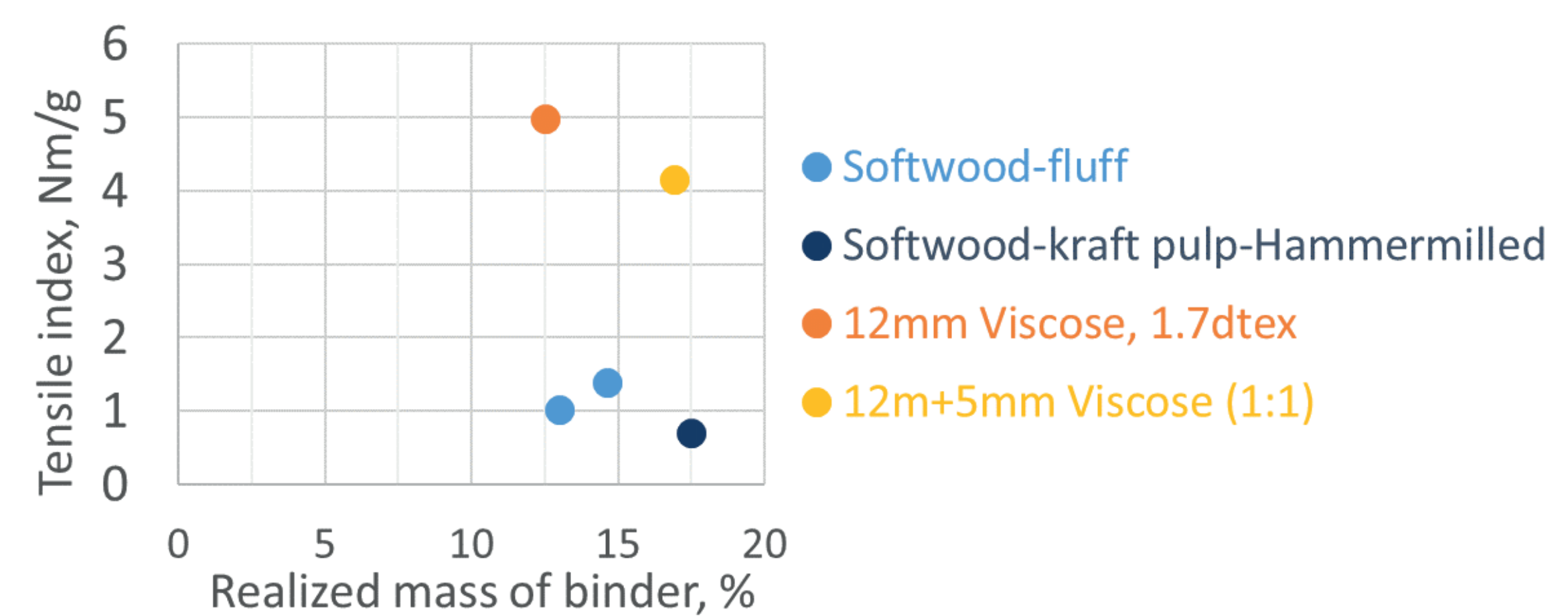
- Several hammermills
- Short-fiber airlaying apparatus
  - Walkisoft drum former
  - Lab-scale: A4-size sheet, max sheet height ~10 cm
- Bonding technologies
  - Spray & foam, thermal, mechanical: hydroentangling
- Extensive material and thermoformability testing



## Preliminary results

### Fluffed fibers and longer textile fibers as a raw material

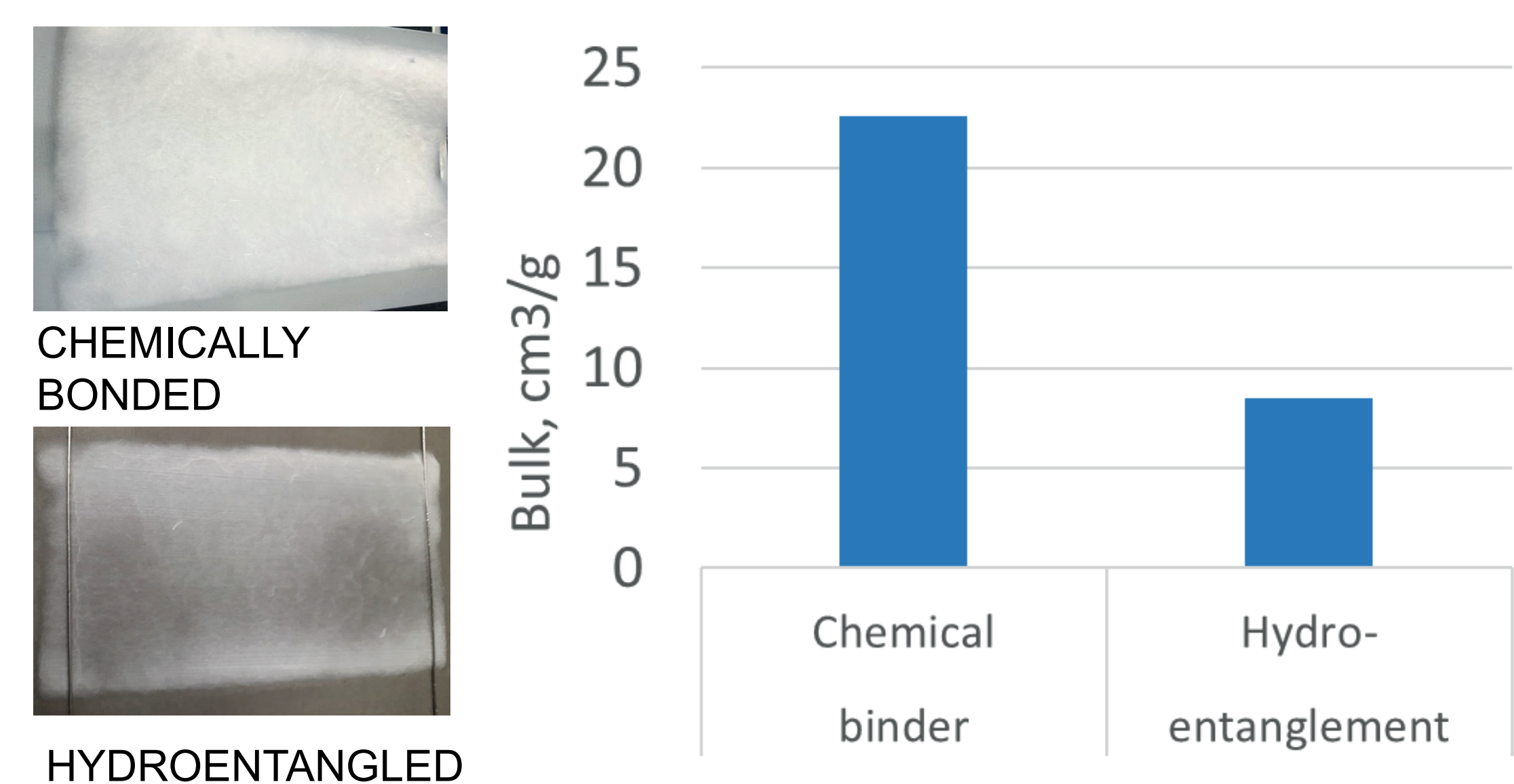
It was possible to use fibers with different lengths in our Walkisoft drum former. Comparison of chemically bonded airlaid sheets showed that longer fibers gave higher tensile index. Additionally, airlaid sheets were prepared from own hammermilled kraft pulp. This enables the use of fluffed straw pulp in the next trials.



Tensile index of chemically bonded airlaid sheet from different fibers. Commercial aqueous acrylate based dispersion binder was sprayed on the airlaid sheets.

### Bulk control of airlaids

Longer textile fibers enabled the use of hydroentanglement as a bonding method. By selecting the bonding method for airlaid viscose fiber sheets, the bulk of the nonwoven can be controlled.



Bulk of airlaid sheet from 12 mm viscose fibers, bonded with a commercial aqueous acrylate based dispersion binder and hydroentangling.

### Novel airlaid composites

We have started to experiment with airlaying as a manufacturing method of thermoplastic composite structures

1. At first, conventional bico fibers, 3mm, 12mm, 25-70 wt%
2. Later, replacing bico with PLA/coPLA fibers

