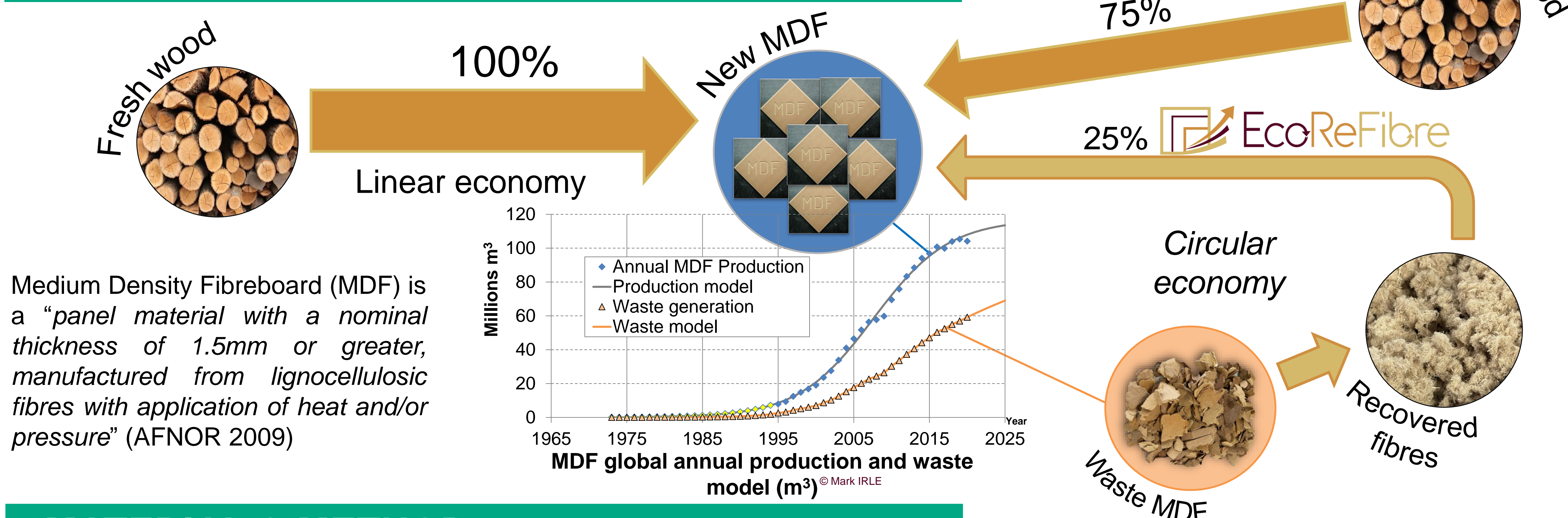


MDF wood fibre strength after several recycling cycles

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CONTEXT & OBJECTIVES



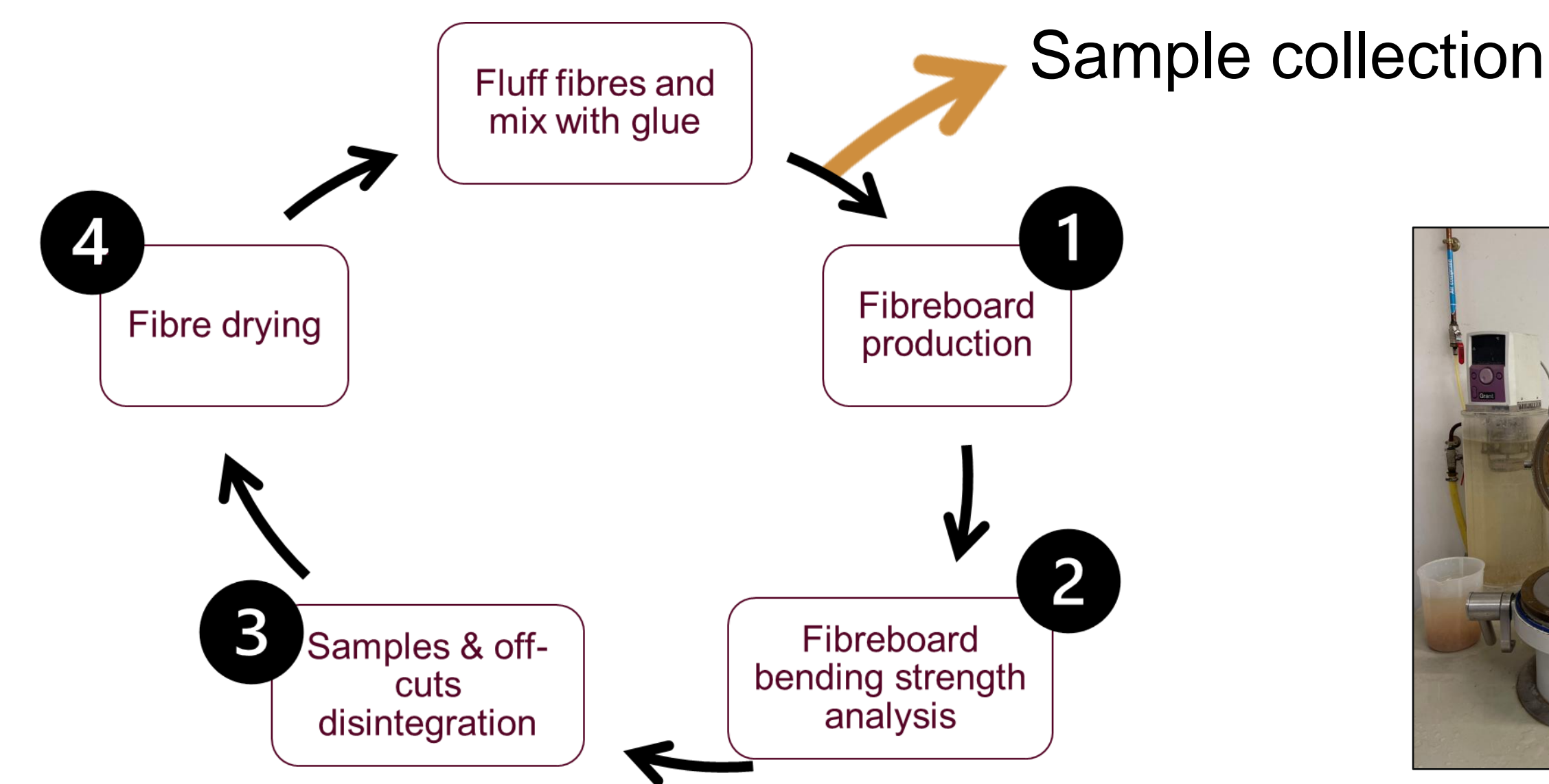
QUESTION
 How many times can the same wood fibre be recycled?

OBJECTIVE
 Characterise individual wood fibres mechanically after 1 to 6 recycling cycles to understand the impact of the process on fibre quality

MATERIAL & METHOD

RECYCLING EXPERIMENT

PAPER MAKING



- Every sample collected from the recycling experiment was sieved under 1 mm
- Mix of 15% of eucalyptus pulp + 85% of recovered fibres
- At least 10 handsheets by batch were made using an adapted TAPPI method

Simplified diagram of the recycling experiment (4 steps)

Pictures of different steps of paper making and of the handsheet before and after pressing and heating

STANDARD TEST OF THE PAPER INDUSTRY: ZERO-SPAN TEST

- The strength of paper is a function of 3 parameters (Ali, 2018):
- **Fibre strength** → zero-span test only measures fibre strength
 - Bond strength
 - Bonded area

- The sheets were cut into rectangles measuring 2.54 x 10 cm
- The rectangles were weighed to determine their precise grammage (g/m²) (Eperen 1996)
- 2 zero span tests are carried out per handsheet (ISO 15361 2000)

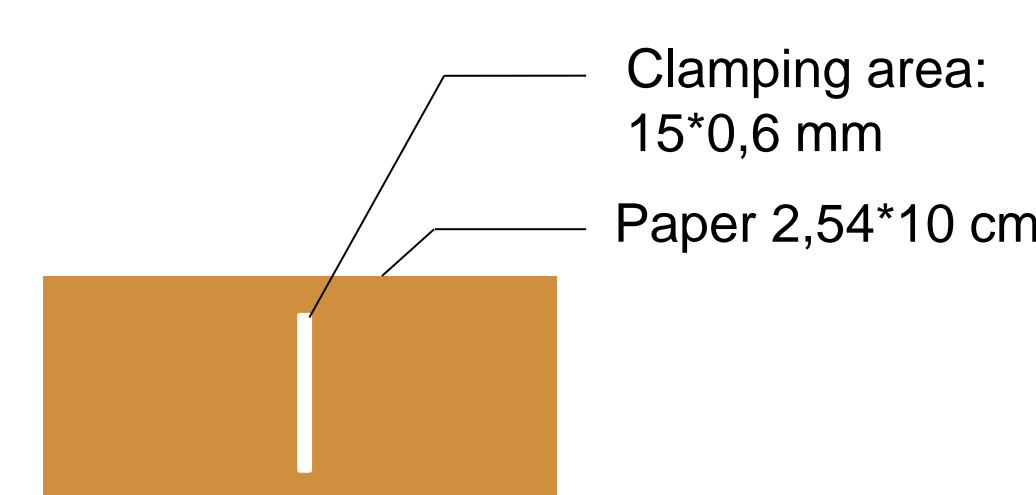
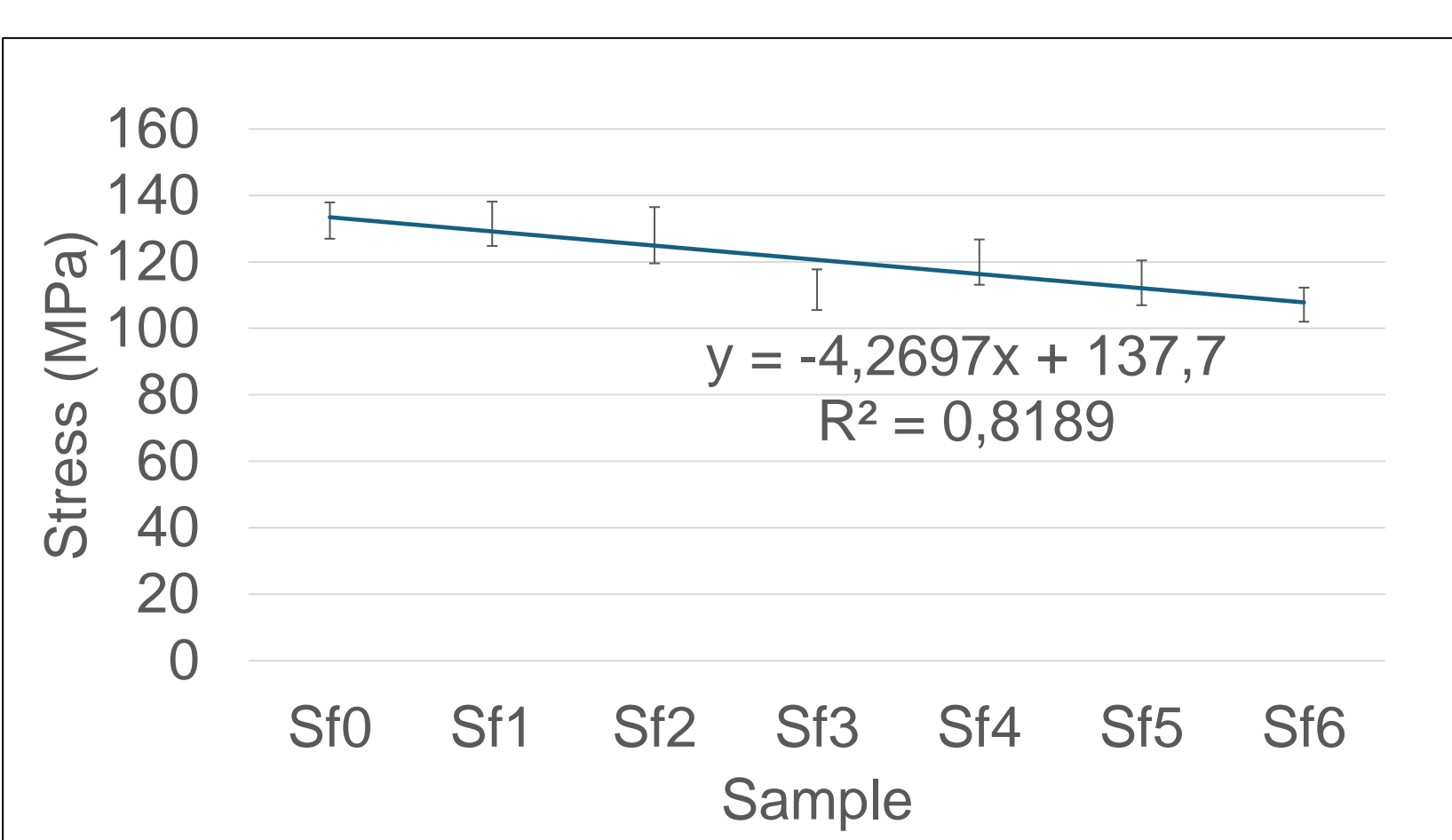


Diagram of a sample, picture of a sample inside the zero-span machine with a zoom on the clamping part

RESULTS



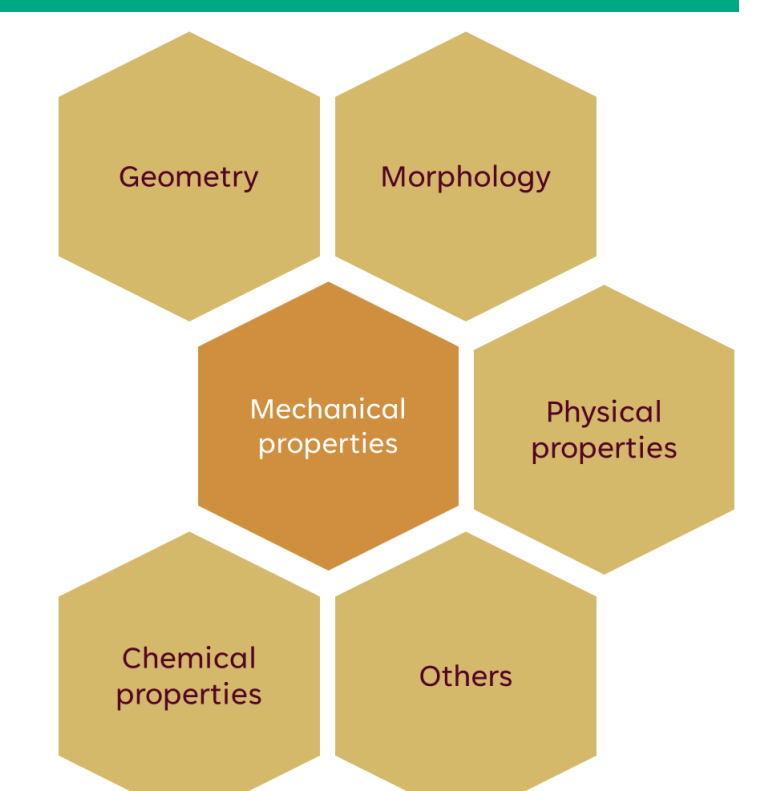
Average stress (MPa) for each set of handsheets

"Sf0": sheets made from the first fibres
 "Sf6": sheets made from fibres that have been recycled 6 times

- The zero span results show very little variation
- A linear relationship can be seen between sample strength and recycle number
- A loss of less than 20% is observed between the initial fibres and those that have gone through 6 recycling cycles
- After an ANOVA test, the first 3 batches show no significant differences

CONCLUSIONS & PERSPECTIVES

The recycling process has an impact on the mechanical characteristics of the fibres, but it should be possible to use fibres that have been recycled several times for the manufacture of new products. The results of this study will be supplemented by other characterisation tests on these same wood fibres in order to gain a better understanding of the impact of recycling cycles on them.



How to characterise a wood fibre?

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