Mechanical recycled resin:
A valuable secondary material for BOPP flexible packaging

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Mechanical Recycling

Part of the Circular Economy

PCR – Mechanical Recycling process

Mechanical recycling refers to operations that aim to recover plastic waste via mechanical processes (grinding, washing, separating, drying, re-granulating and compounding), thus producing recyclates that can be converted into new plastics products.

5 STEPS
to Build a Circular Economy for Flexible Packaging

1. **Drive collection** of ALL flexible packaging for sorting and recycling
2. **Sort and recycle** the suitable mono-material fractions
3. **Redesign** multi-material flexible packaging to mono-materials with existing recycling streams where possible
4. **Identify solutions** and develop capabilities to sort and recycle the remaining fractions
5. **End markets** for all recycled flexible packaging materials

These 5 steps have been endorsed by the CEFLEX stakeholders together with a set of actions needed by each part of the flexible packaging value chain

CEFLEX

Executive Summary
Designing for a Circular Economy
Phase 1

Trials conducted in CEFLEX

Workstream 3

Trials conducted in CEFLEX

Trials August 2019

Trials October 2021

Film Samples:
Description and Material ID

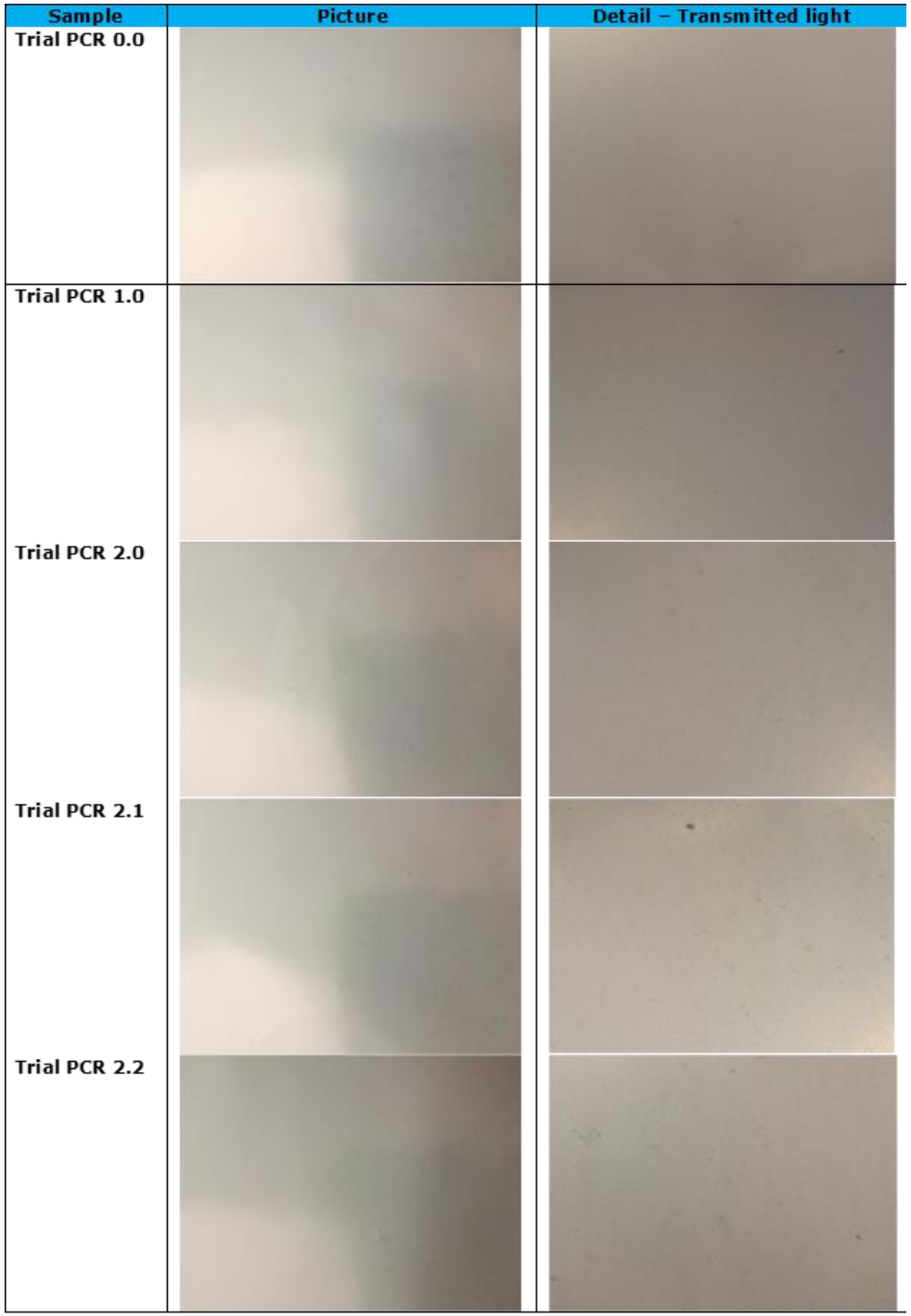
Samples ID	rPP films PCR content in the film (%)	Description
TRIAL PCR 0	0	White voided BOPP film Reference
TRIAL PCR 1	16.2	White voided BOPP film
TRIAL PCR 2	32.4	White voided BOPP film
TRIAL PCR 2.1	32.4	White voided BOPP film
TRIAL PCR 2.2	32.4	White voided BOPP film

Overview Films: Analysis

Aesthetical Aspect:

Comparing the reference sample TRIAL PCR 0 -0% of rPP film with the others, it is possible to see, as expected, an increased spots number.

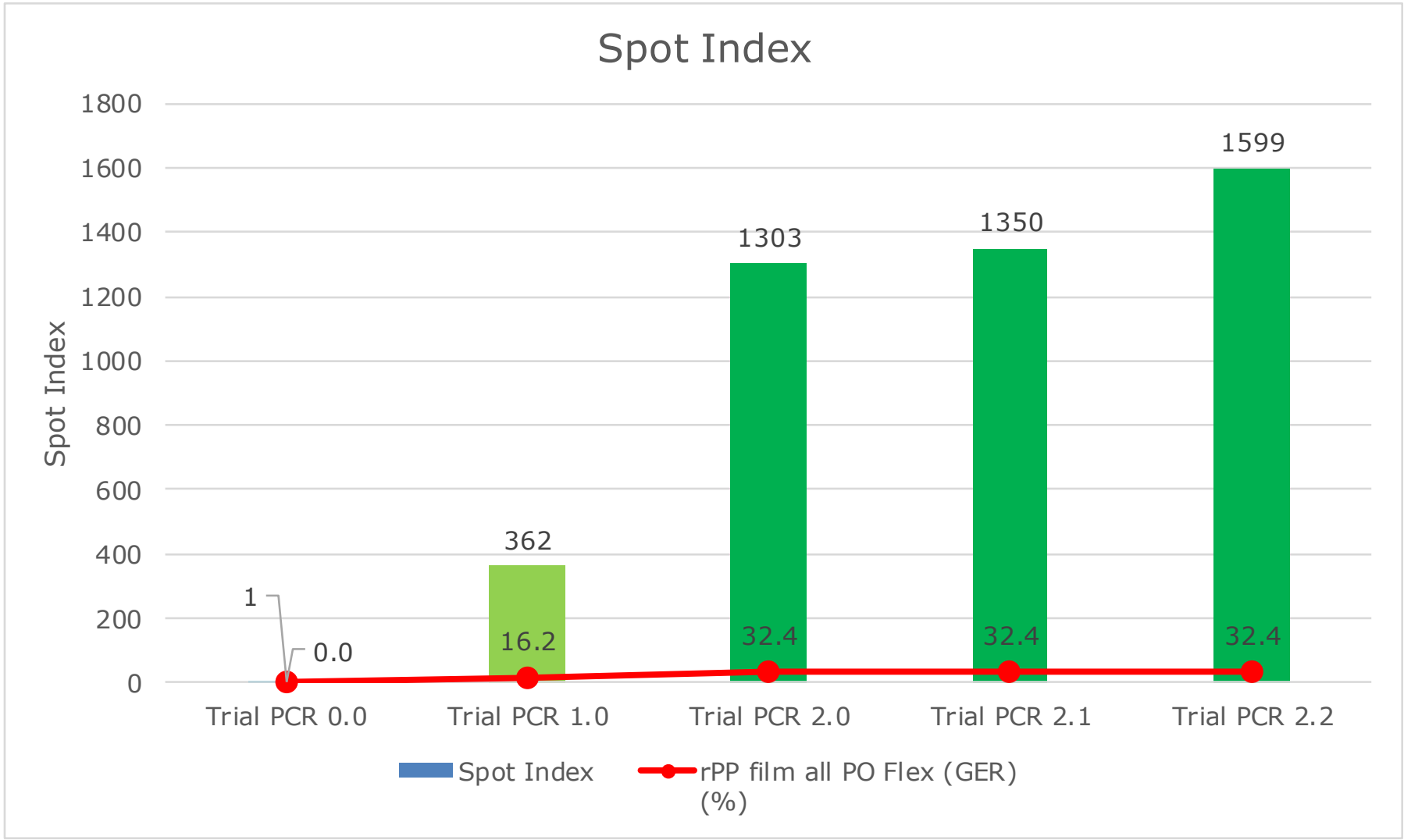
Other aesthetical defects were visible but could be improved in the future, assuming advanced developments on PCR recyling and further adjustment of extrusion parameters



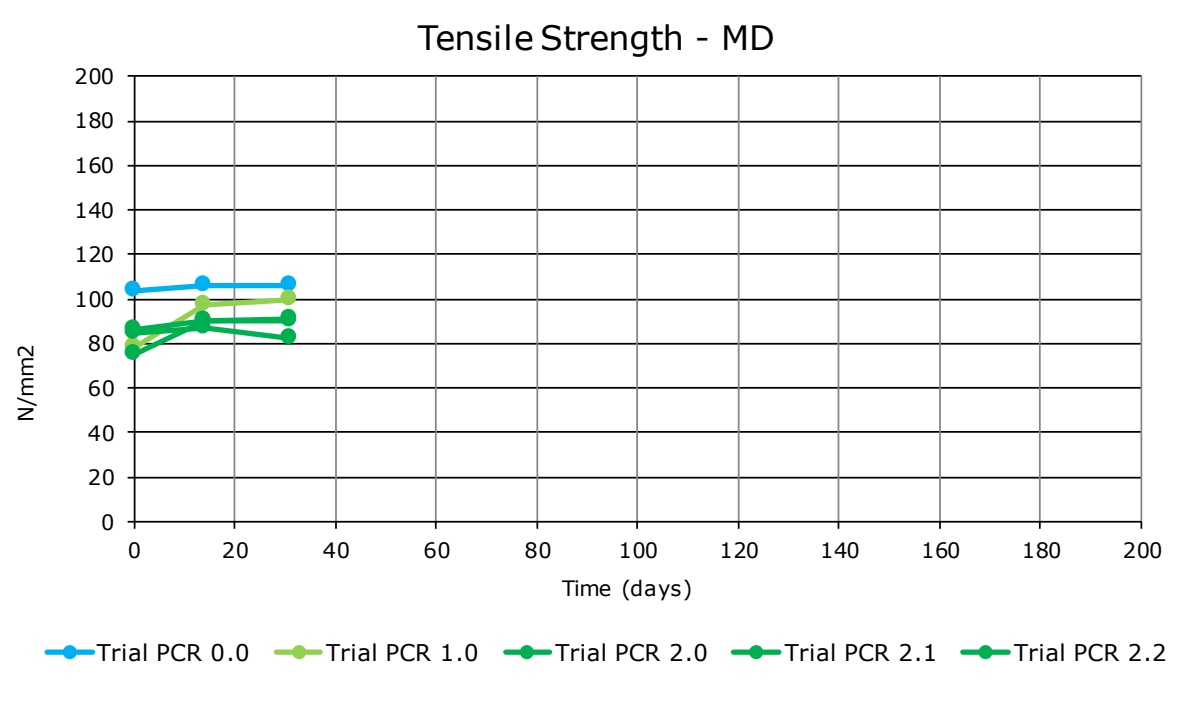
Overview Films: Analysis

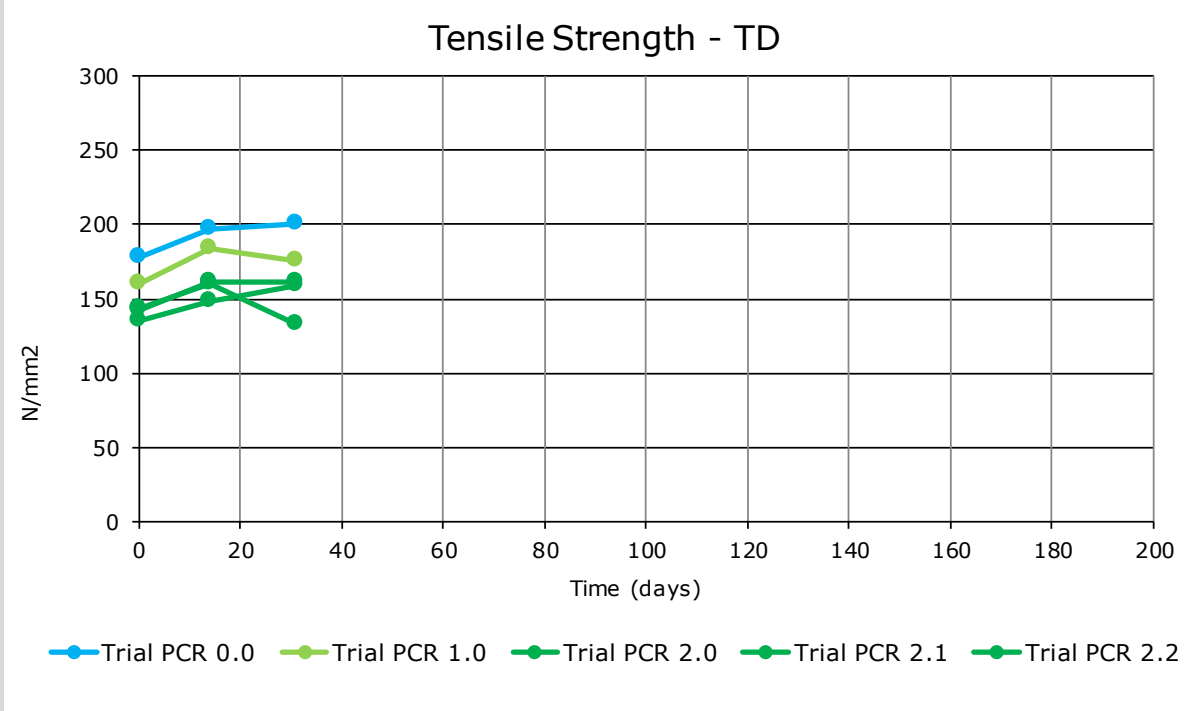
Spot Index:

As expected, spot index is significantly influenced by rPP content



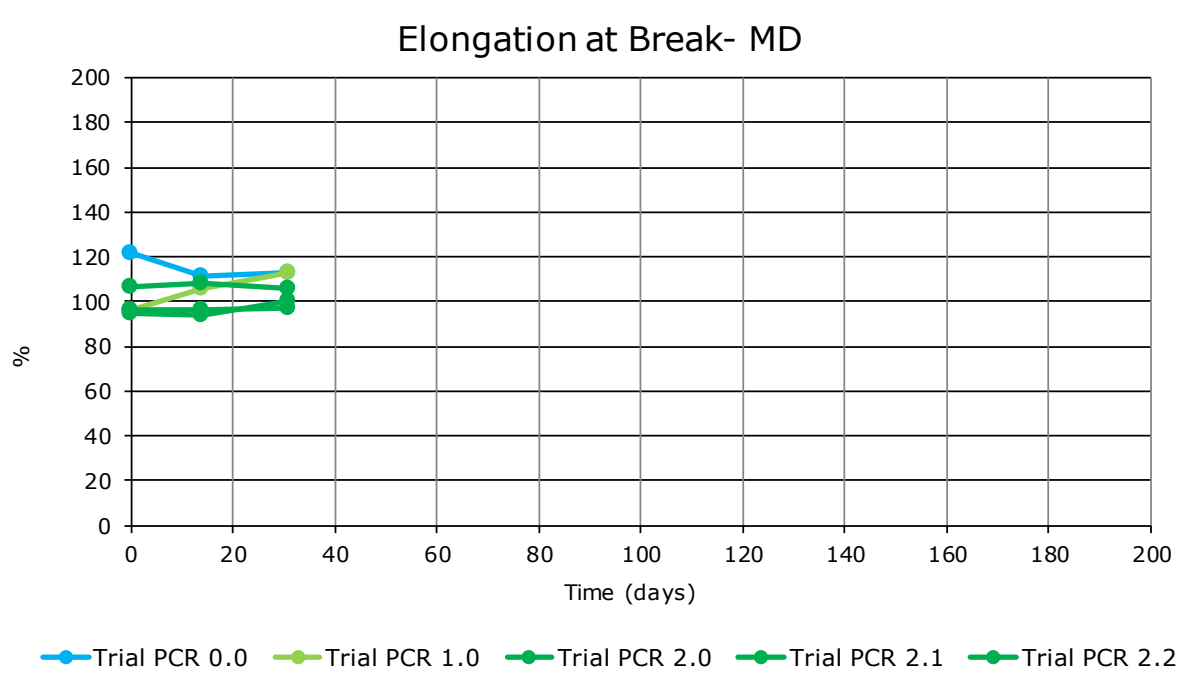
Overview Films:
Analysis

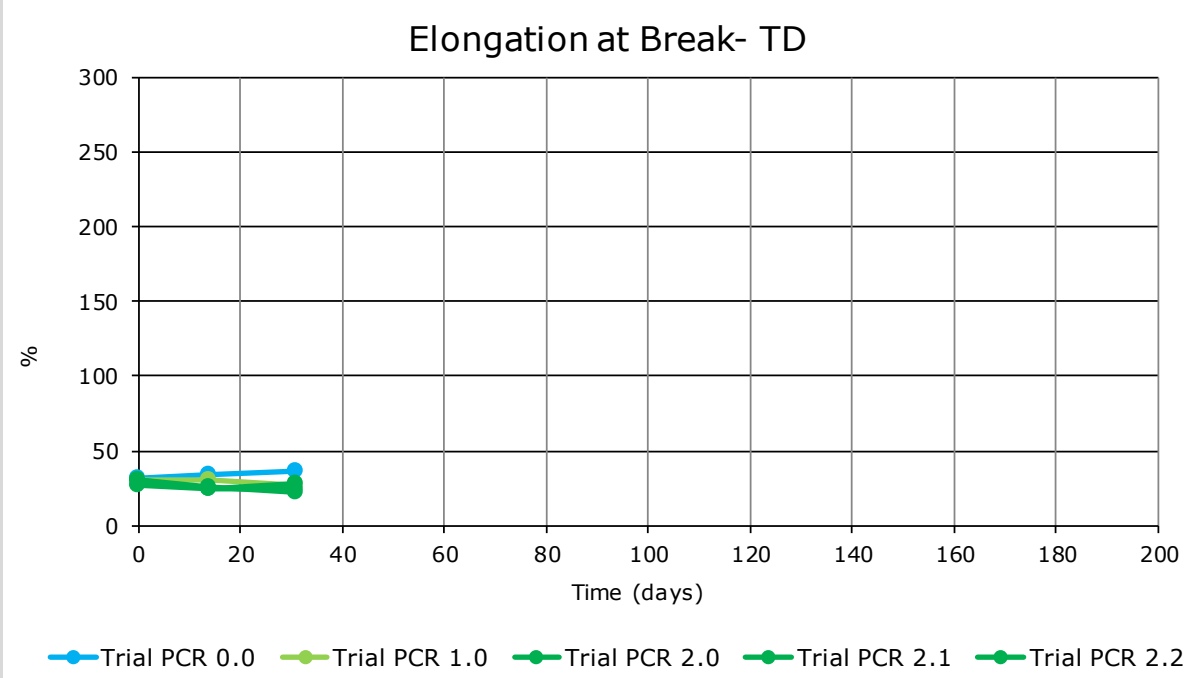




MECHANICAL PROPERTIES: Tensile Strength

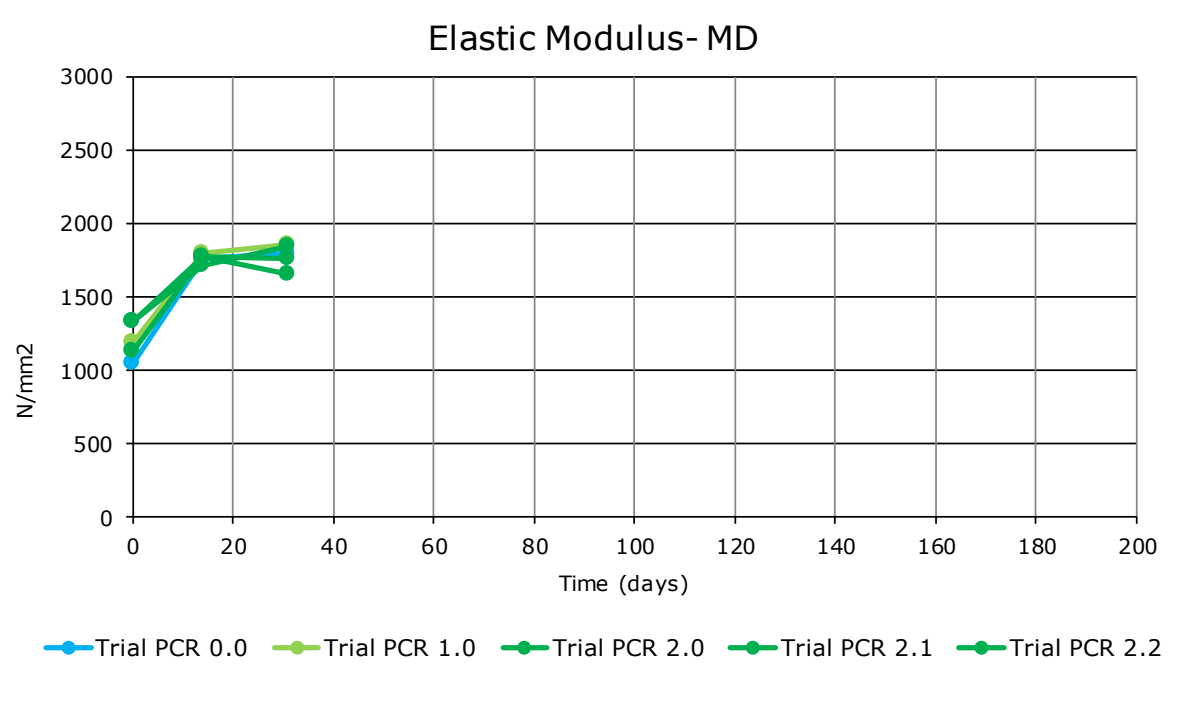
Overview Films: Analysis

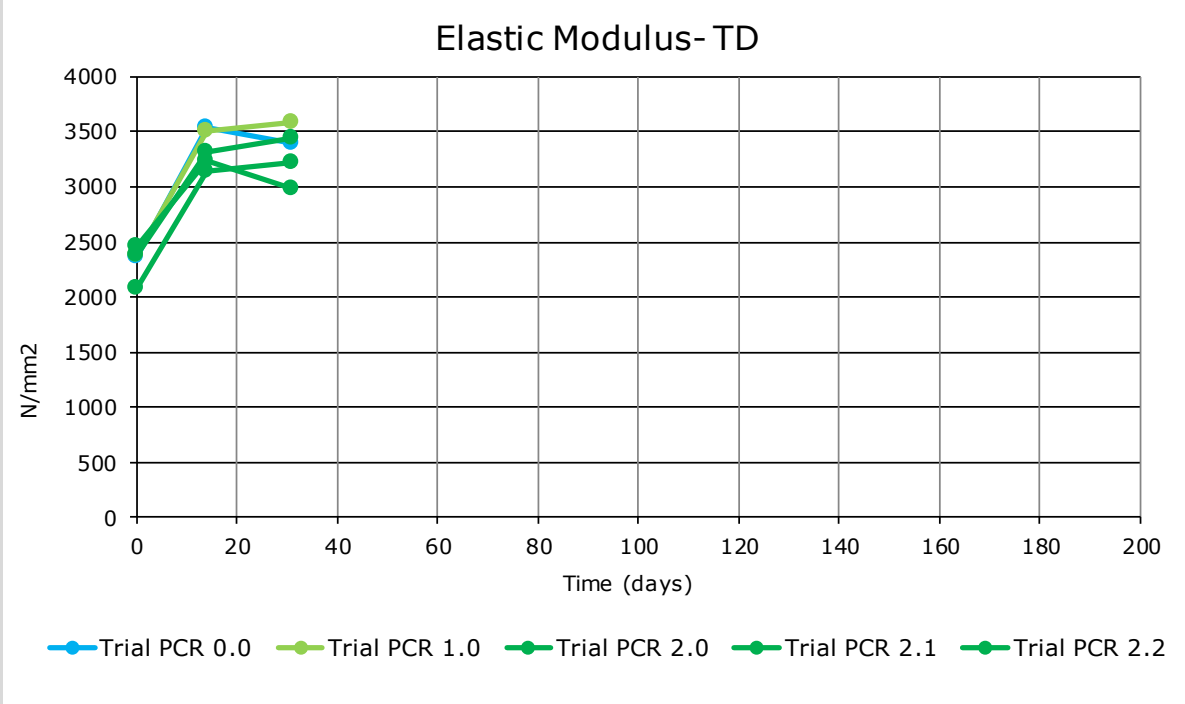




MECHANICAL PROPERTIES: Elongation at Break

Overview Films: Analysis



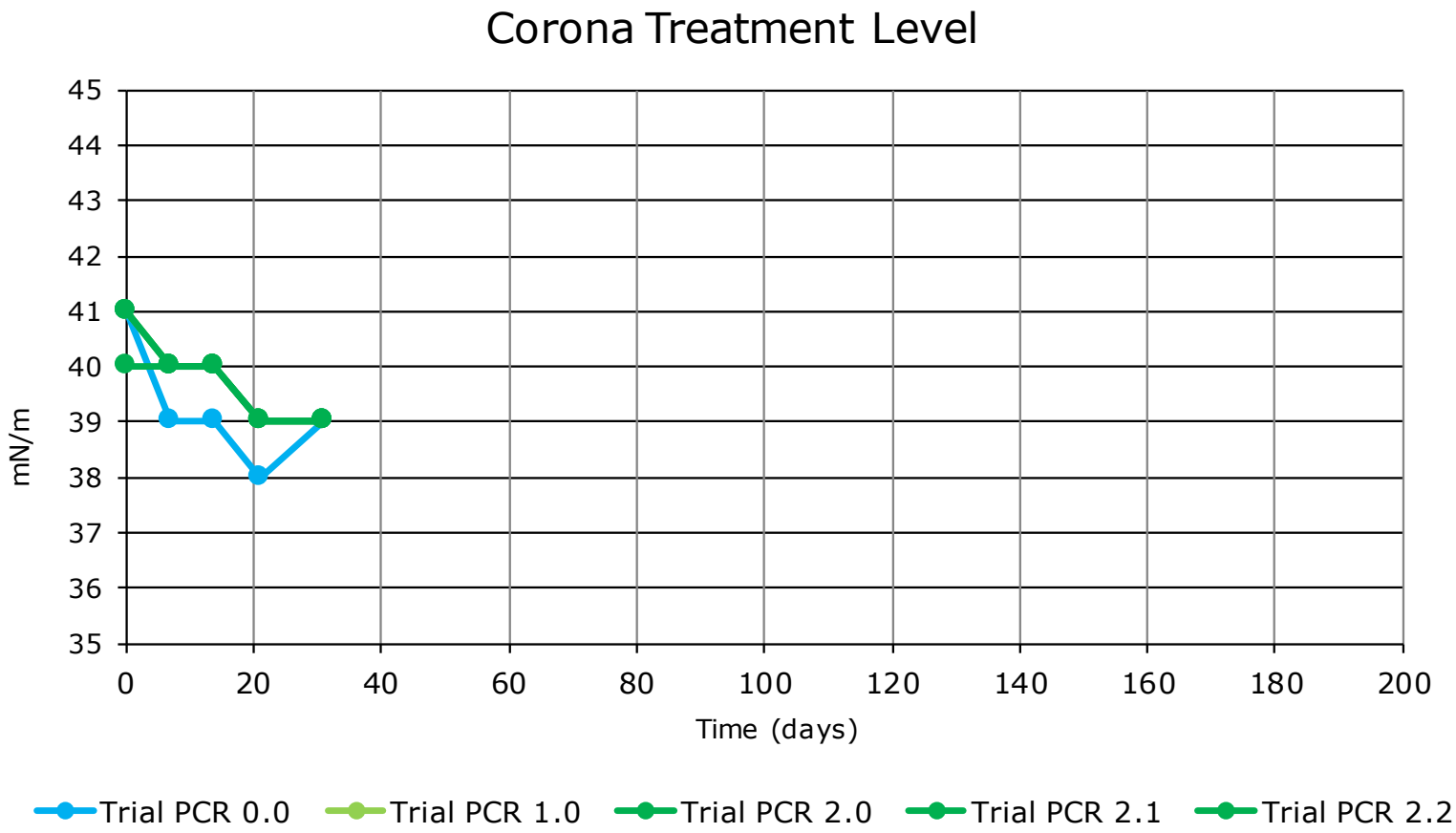


MECHANICAL PROPERTIES: Elastic Modulus

Overview Films: Analysis

Treatment Level:

No significant difference to be reported



Overview Films: Analysis

- **Hot Tack and Seal Strength**
  No significant difference
- **Thermal Shrinkage**
  It seems that PCR material has a slight positive impact on the film thermal shrinkage
- **COF**
  No difference
- **PIN PUNCTURE**
  There is no significant influence of the rPP film all PO Flex (GER) content, mainly on the force and energy

Based on the characterization, the film is suitable for **NON FOOD APPLICATIONS** such as:

- **LABELS**
  - WAL (Wrap Around Labels)
  - PSL (Pressure Sensitive Labels)
- **Other Non Food Applications**
  - Pouches
  - Horizontal/Vertical Flow Wrap

Taghleef Industries

For more information

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