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NOVEL BIOBASED MATERIALS TO IMPROVE CIRCULARITY

Improving the circularity of complex plastic multi-material composites using novel biobased materials in B2B semi-finished products

Product manufacturing adaptations from different PA formats

Open training session - Silkeborg

25th March 2026

Julio Vidal

MOSES

Julio.vidal@mosesproductos.com

Circular Bio-based Europe Joint Undertaking

Bio-based Industries Consortium

Funded by the European Union

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GA. No: 101111996

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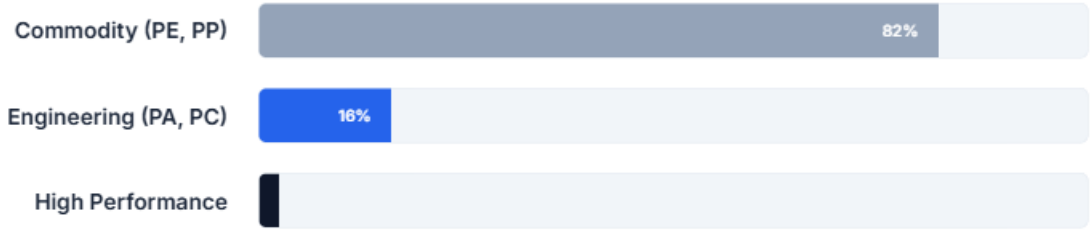
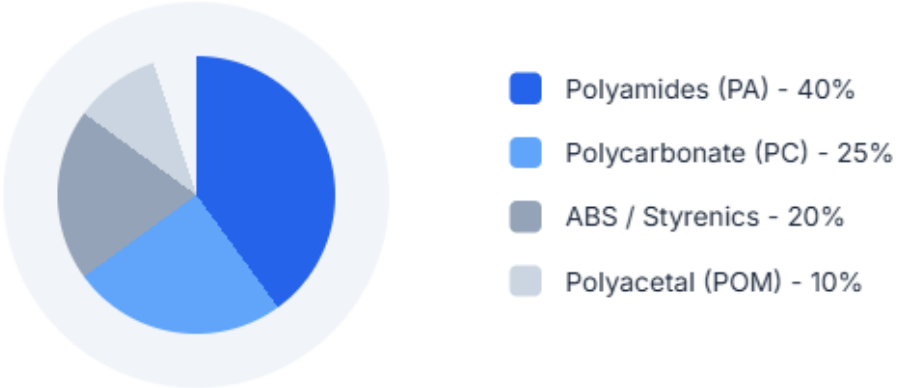
PA materials

Global Plastics Context (2025)





PA is the primary driver of the Engineering segment.

398 to 430 million metric tons of plastic in 2025.

USD 600 Billion to USD 960 Billion in 2025

USD 130 Billion to USD 155 Billion of that total

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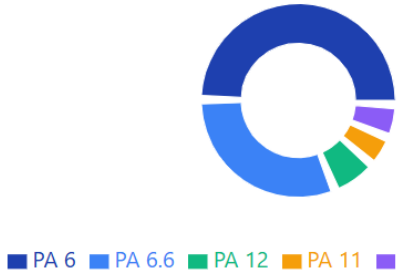
Polymeric materials

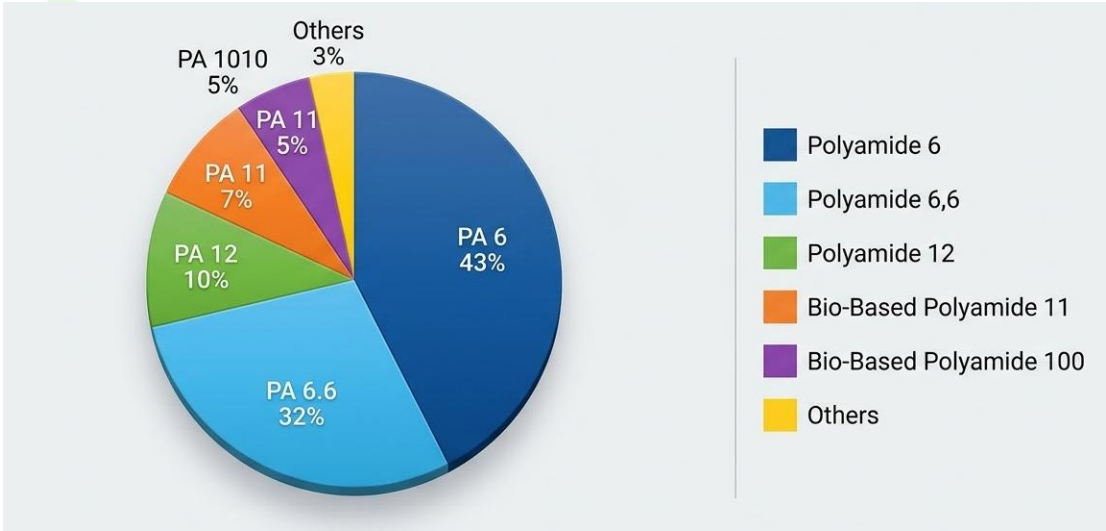


The Dominant Duo

PA6 and PA6.6 represent over 80% of volume. They are the backbone of engineering applications.

Specialty Growth

PA12 and Bio-based grades (PA11/1010) show higher CAGR due to extreme environment requirements.



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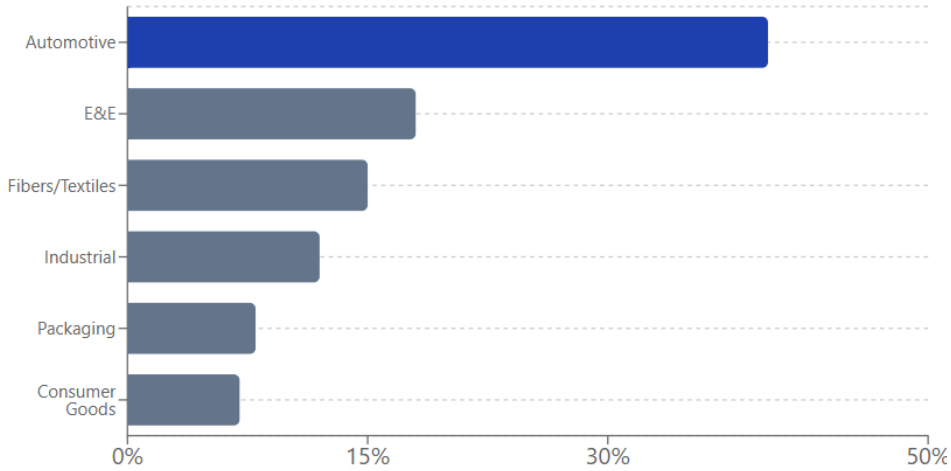
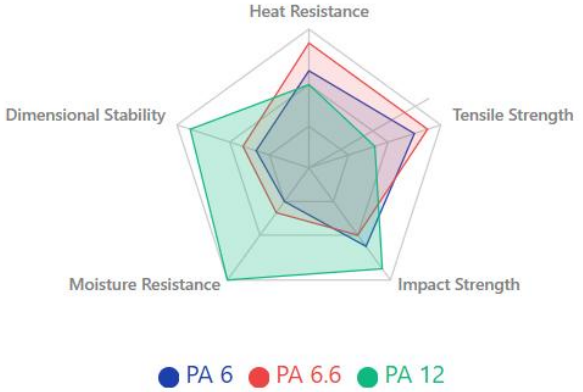
PA materials





AUTOMOTIVE
Weight Reduction

ELECTRONICS
Insulation Needs

ESG TREND
Bio-alternatives

Moisture Gap

PA6/66 are hydroscopic. Adaptations: High-efficiency dehumidifying dryers required before processing.

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PA materials

MONOMER TYPE

Polyamide 6

$$-NH-(CH_2)_5-CO-_n$$

- **Synthesis:** Ring-opening polymerization of Caprolactam monomer.
- **Chain Orientation:** Directional amide groups (all heads-to-tails).
- **Processing:** Lower molecular symmetry leads to slower crystallization and high melt fluidity.

DIMER TYPE

Polyamide 6.6

$$-NH-(CH_2)_6-NH-CO-(CH_2)_4-CO-_n$$

- **Synthesis:** Polycondensation of Adipic Acid and Hexamethylenediamine.
- **Chain Orientation:** Alternating amide groups creating perfect symmetry.
- **Performance:** Tighter molecular packing and H-bonding result in higher thermal stability (Tm: 265°C).

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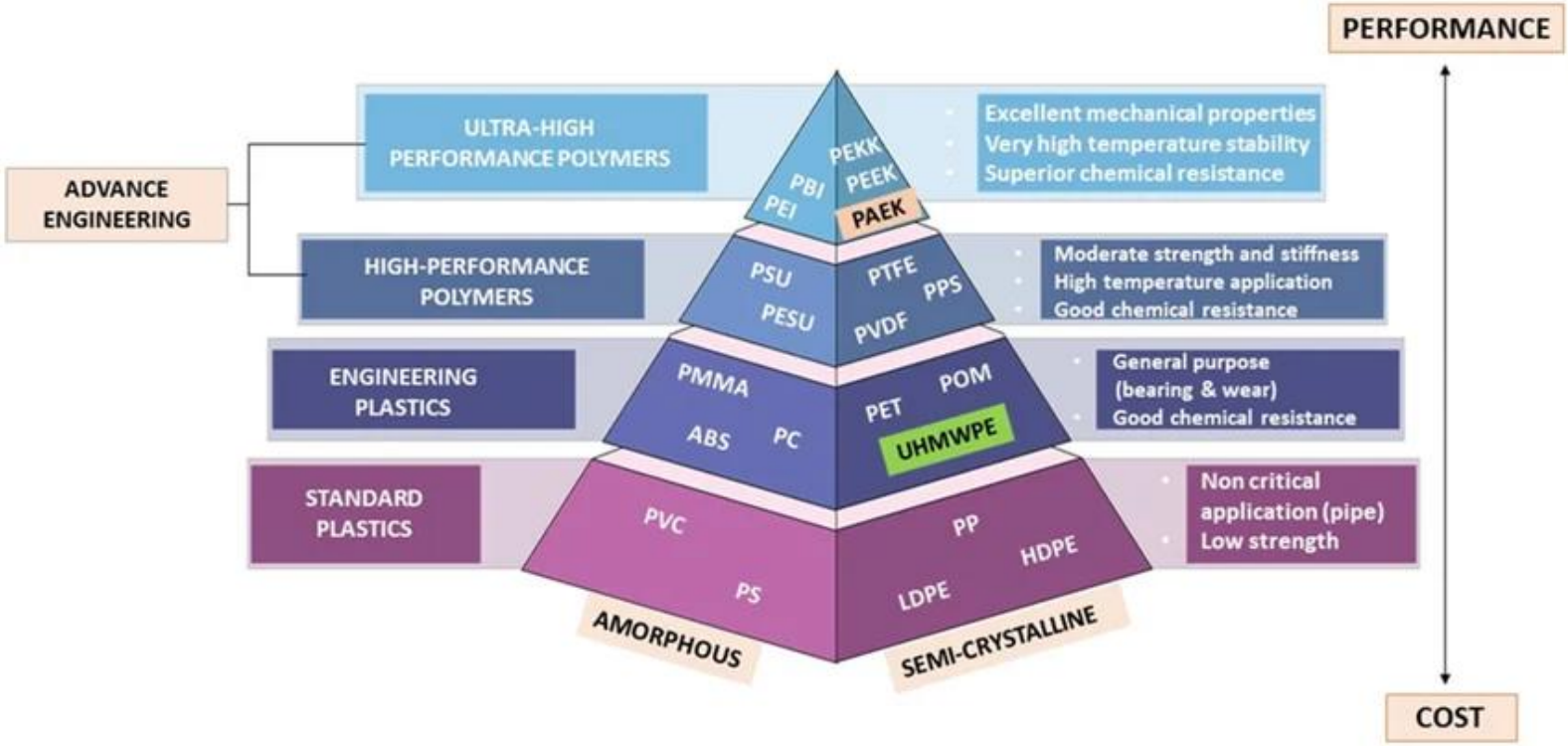
Classification by structure



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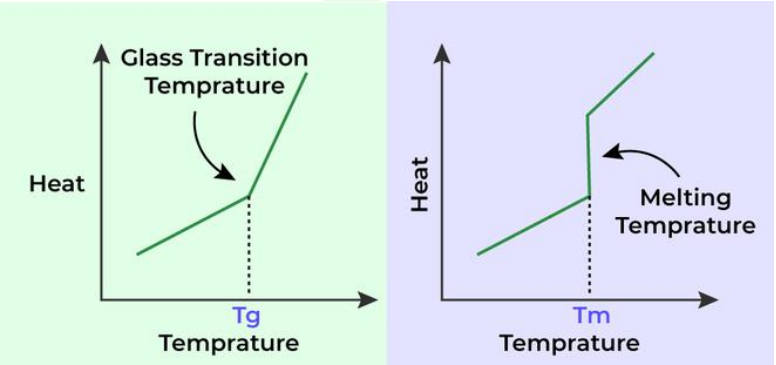
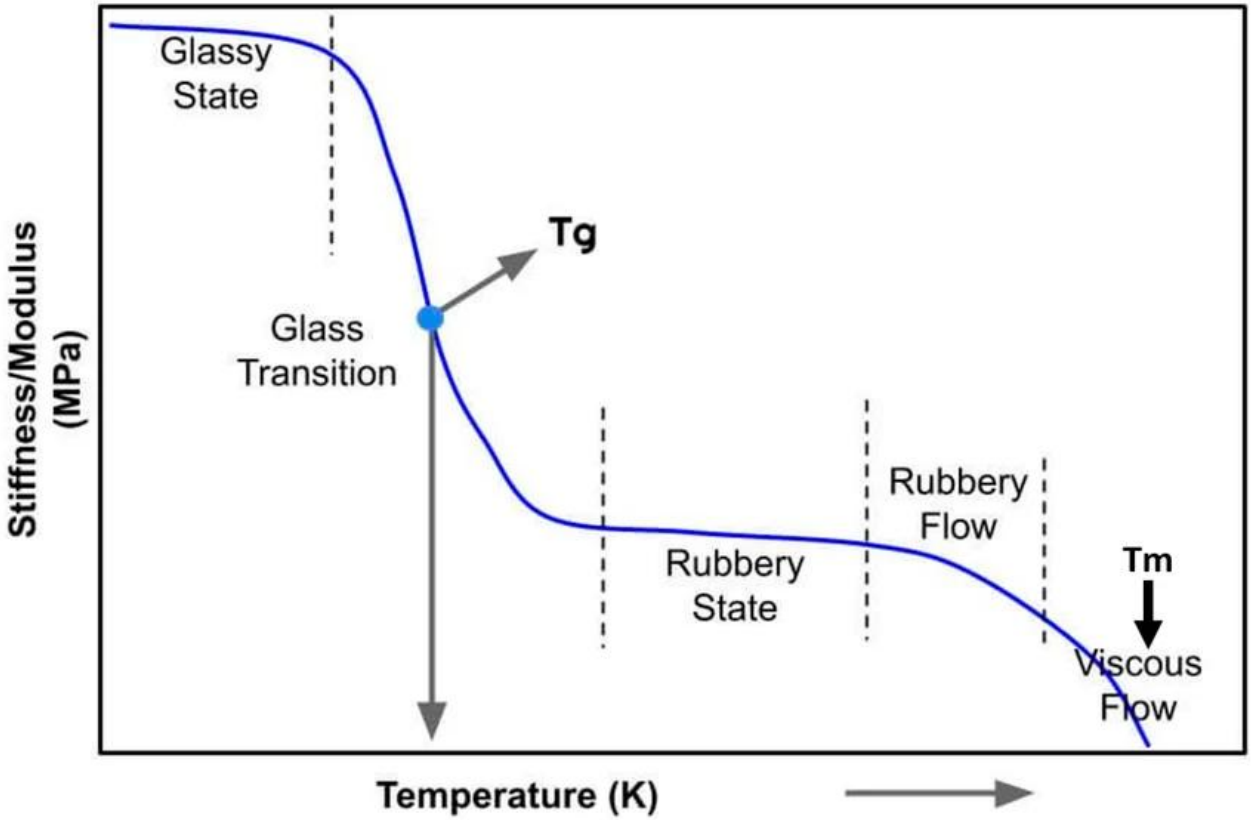
Material properties





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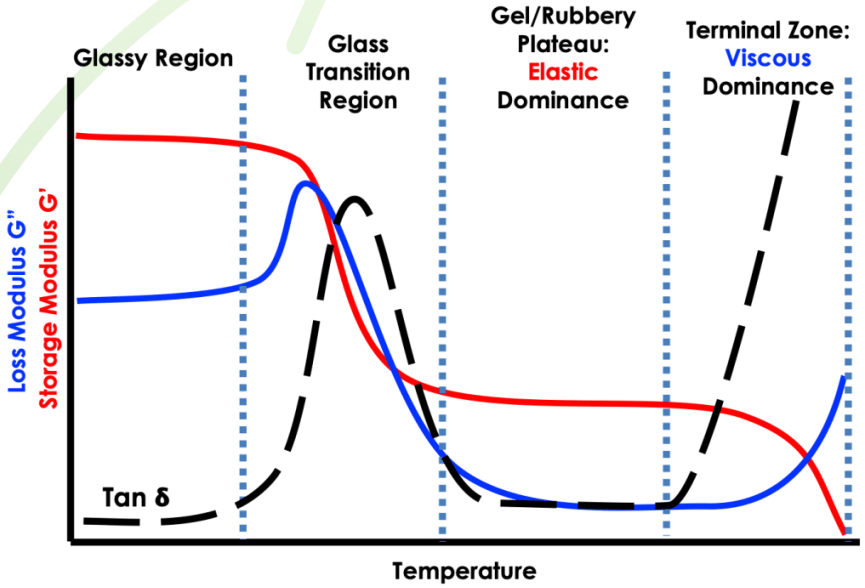

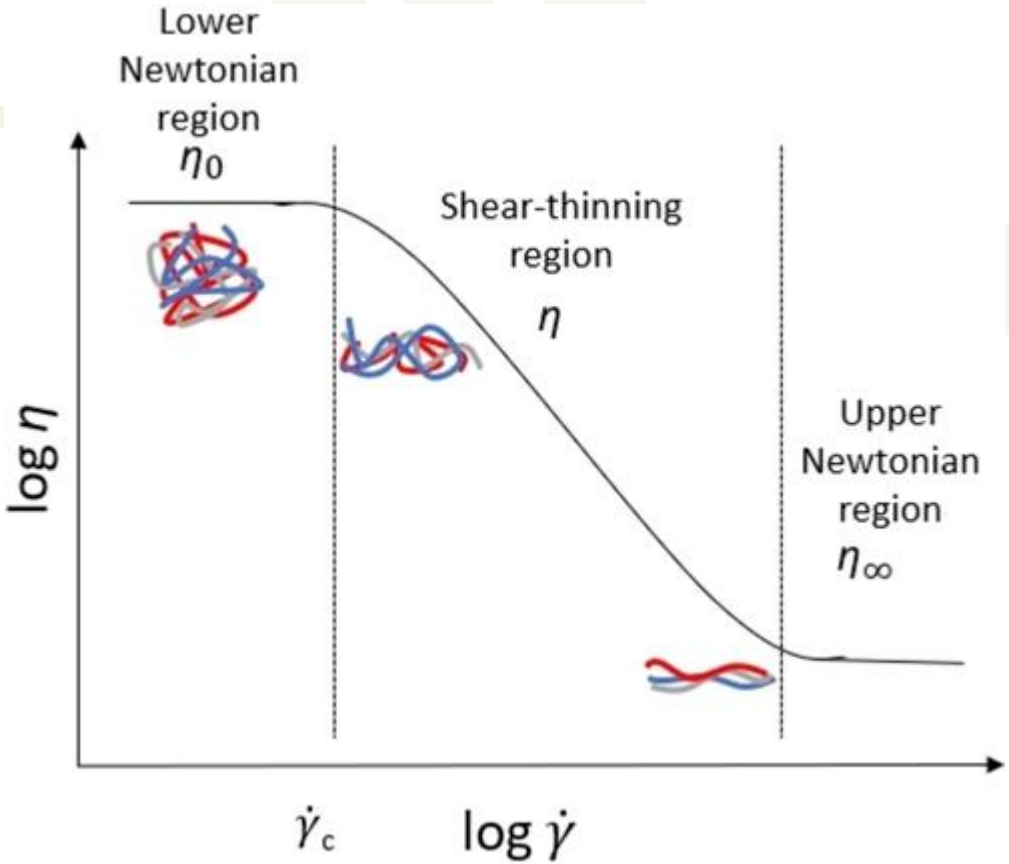

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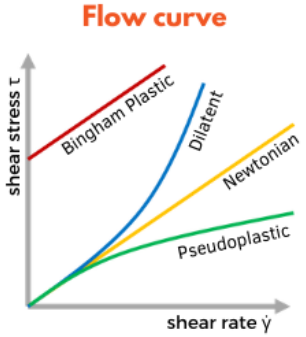

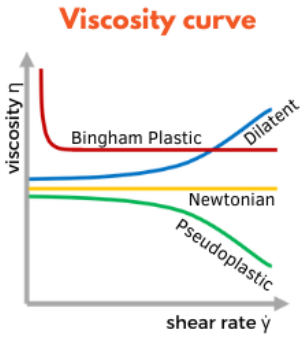

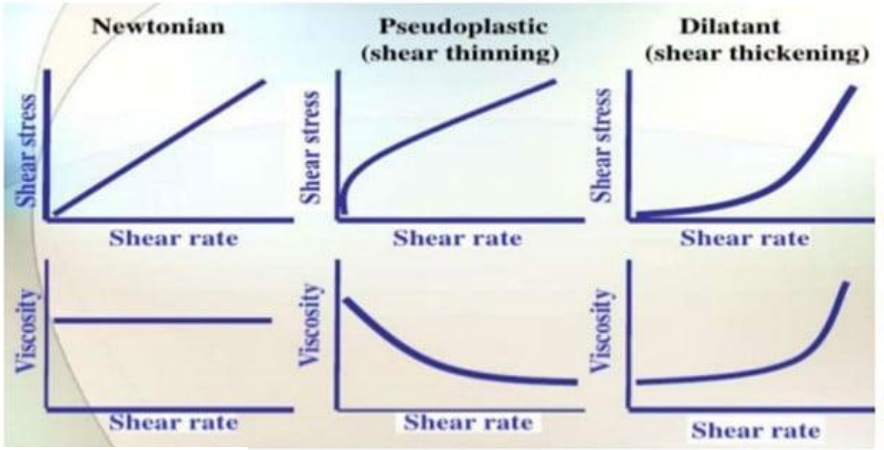

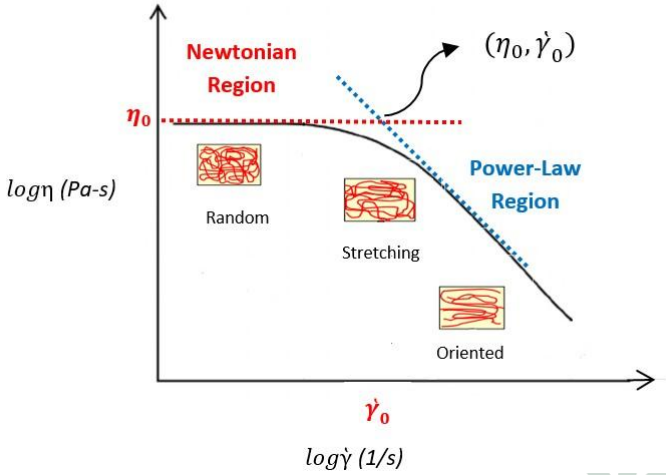

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PROCESSING

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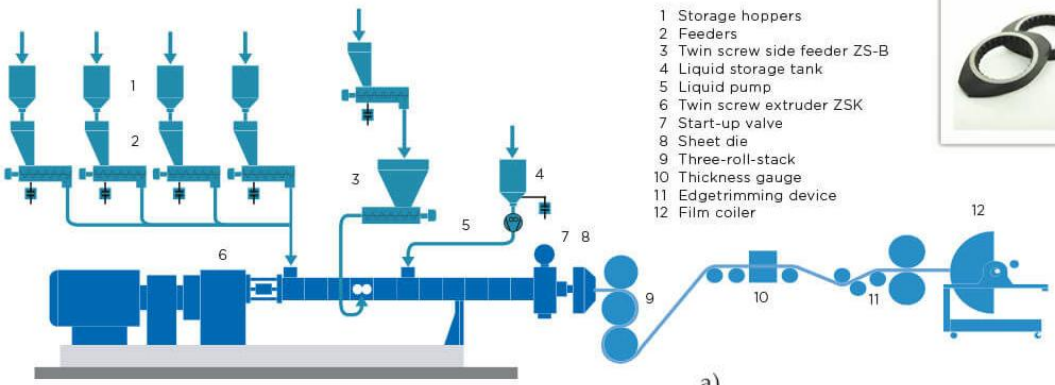
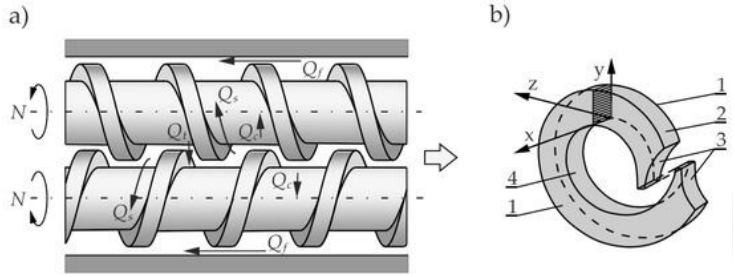
Extrusion process

Production of foamed and cross-linked films





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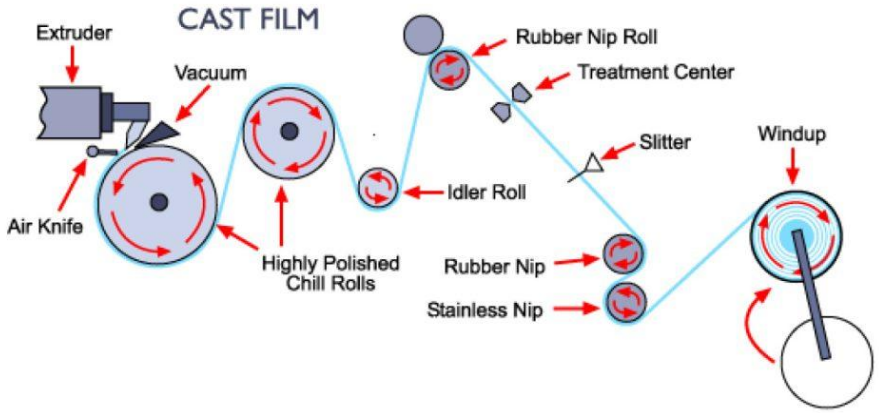
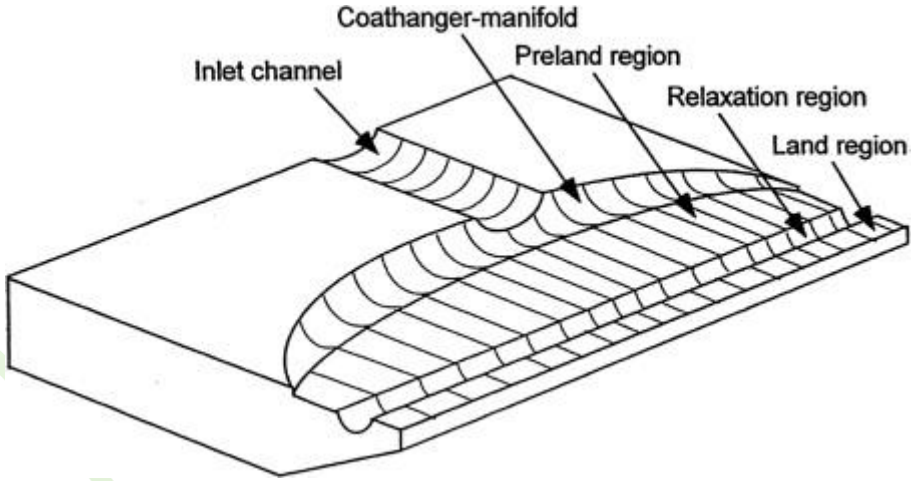
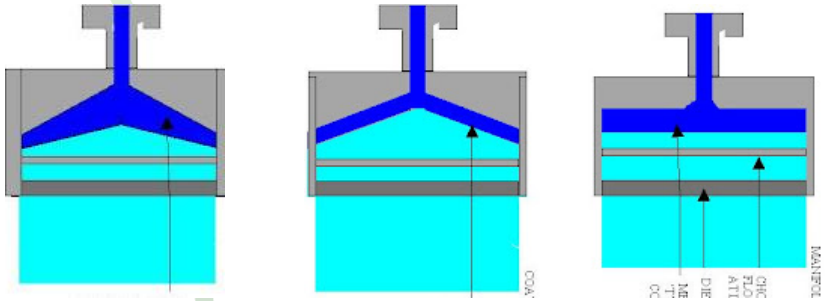
Casting extrusion process







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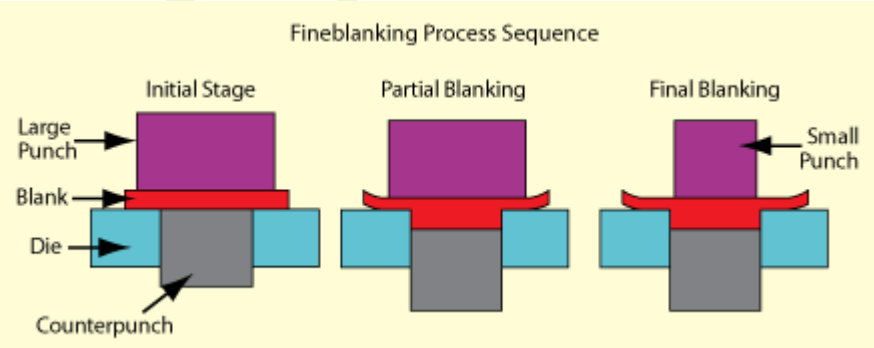
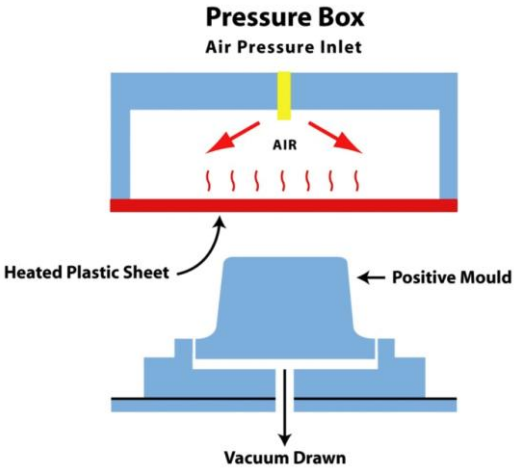
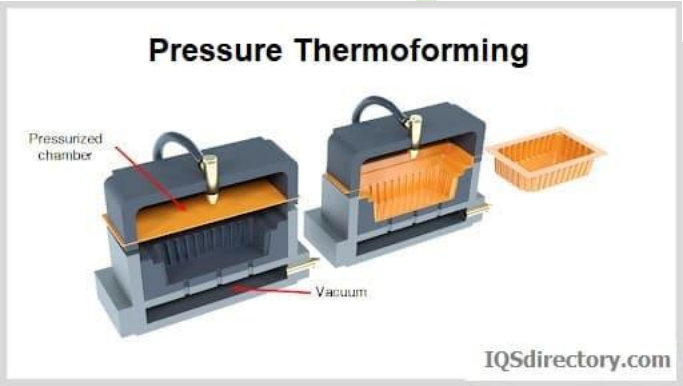
Thermoforming







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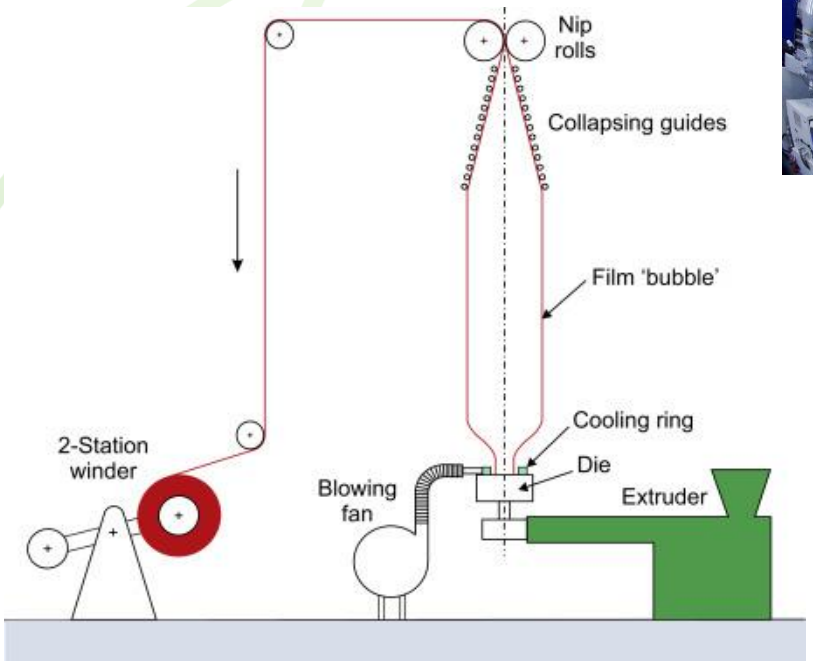
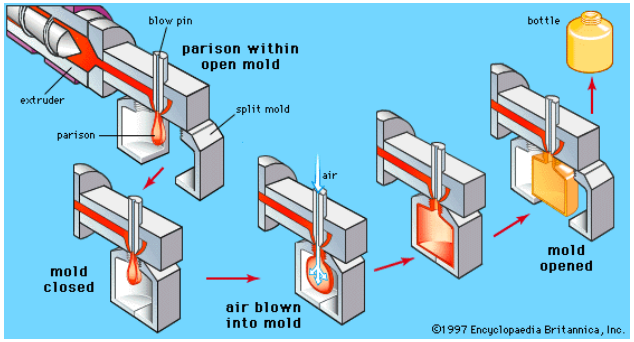
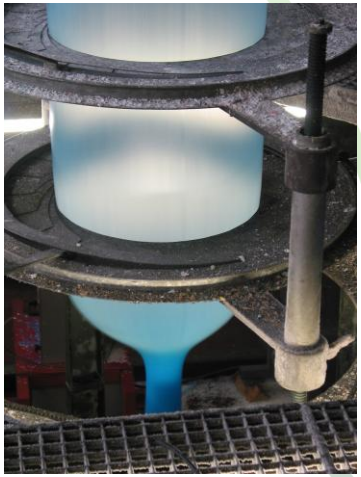
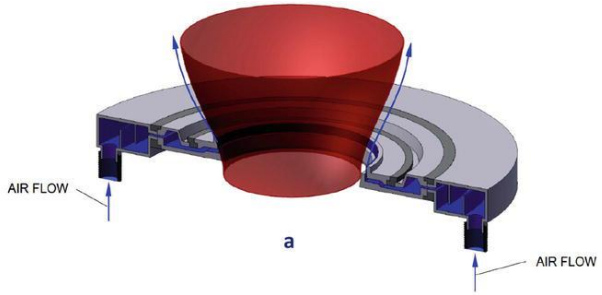
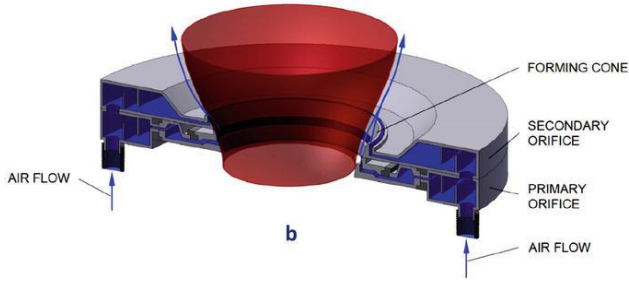
Blowing processes











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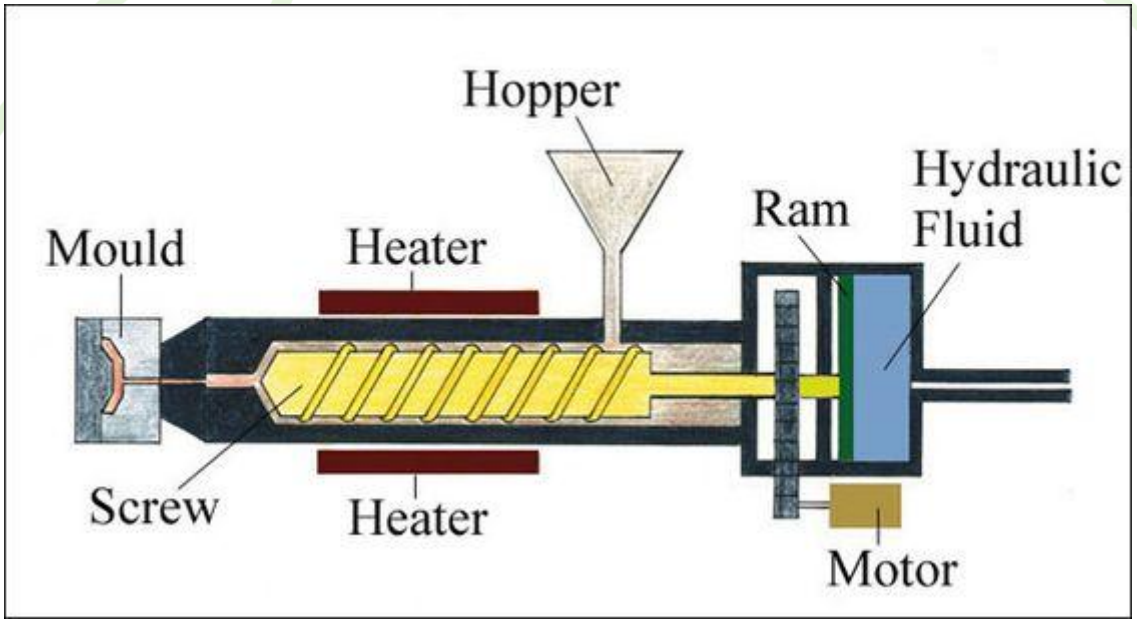
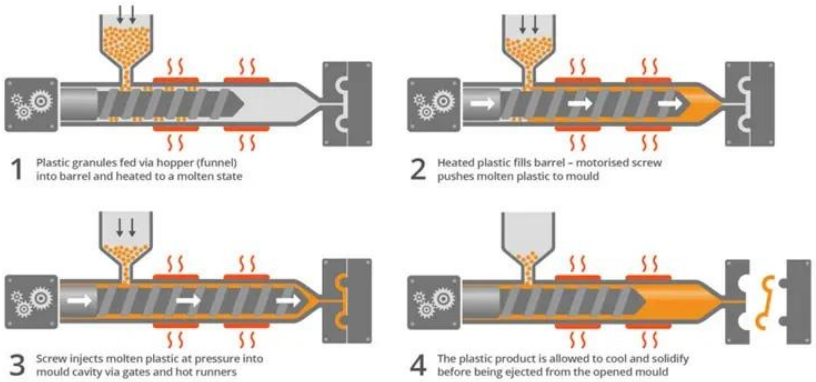
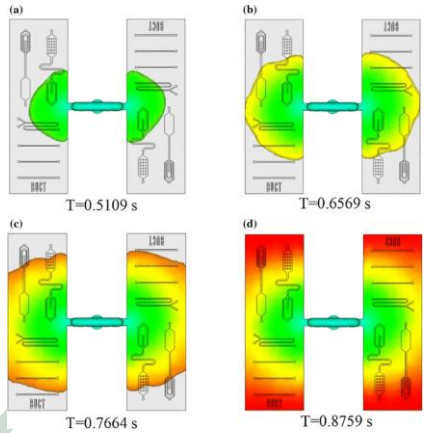
Injection moulding







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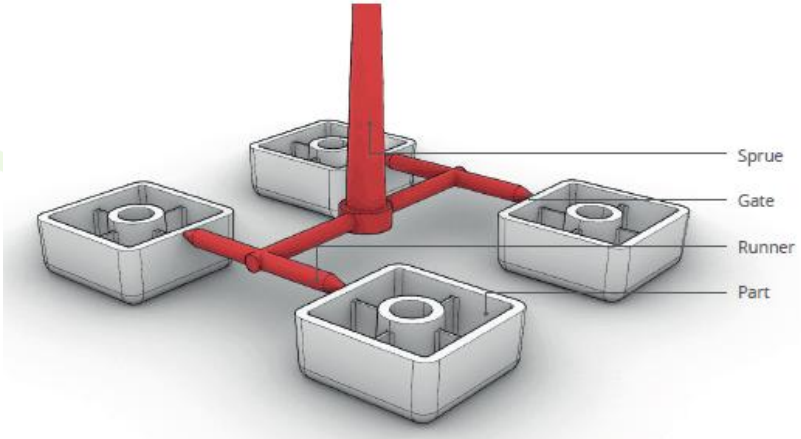

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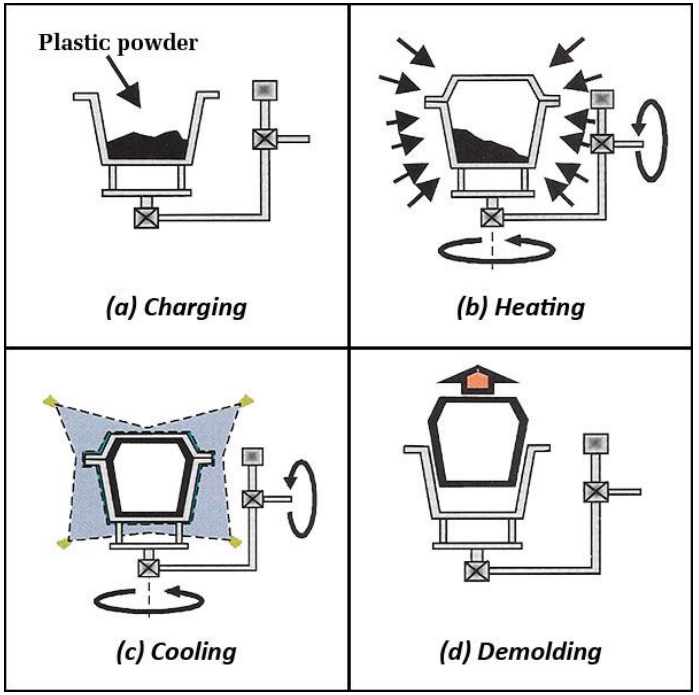
Rotomoulding



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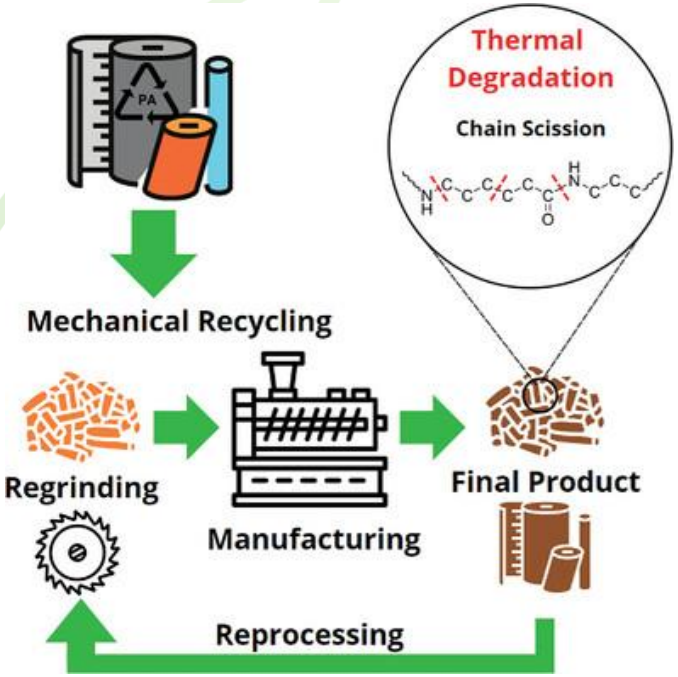
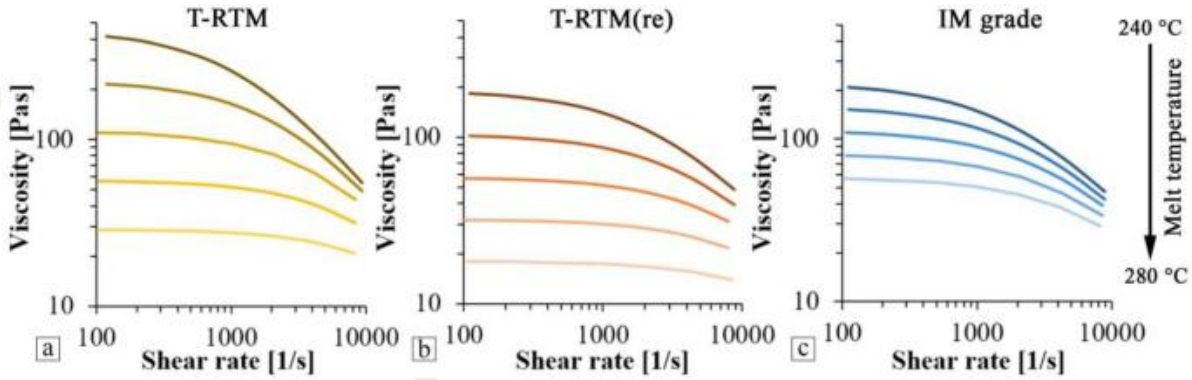
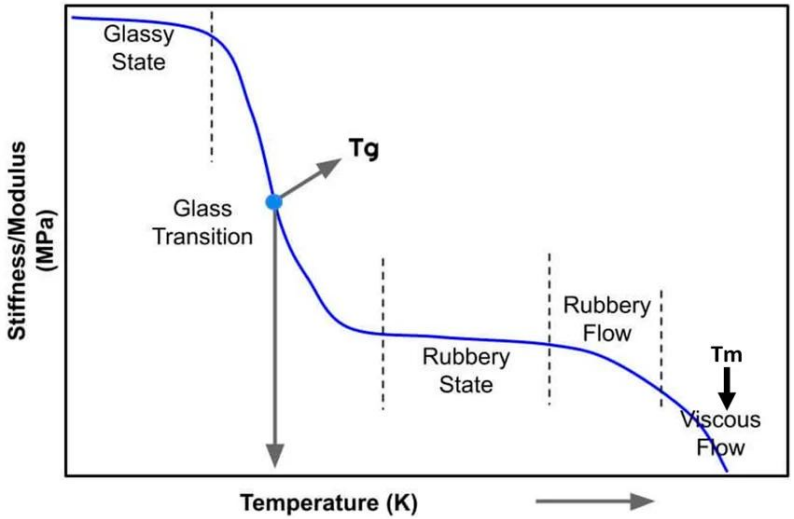
Reprocessing







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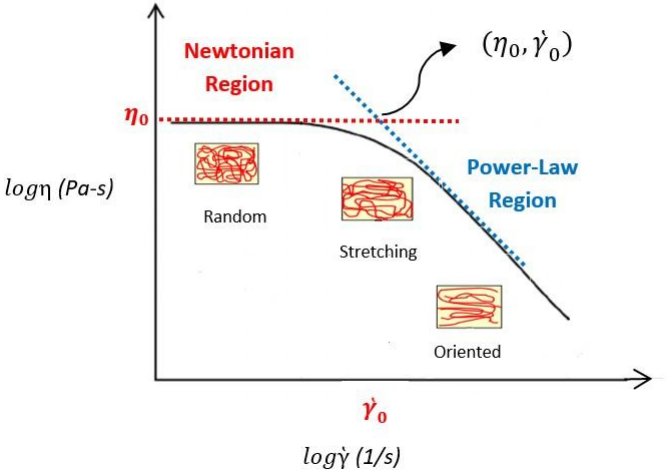
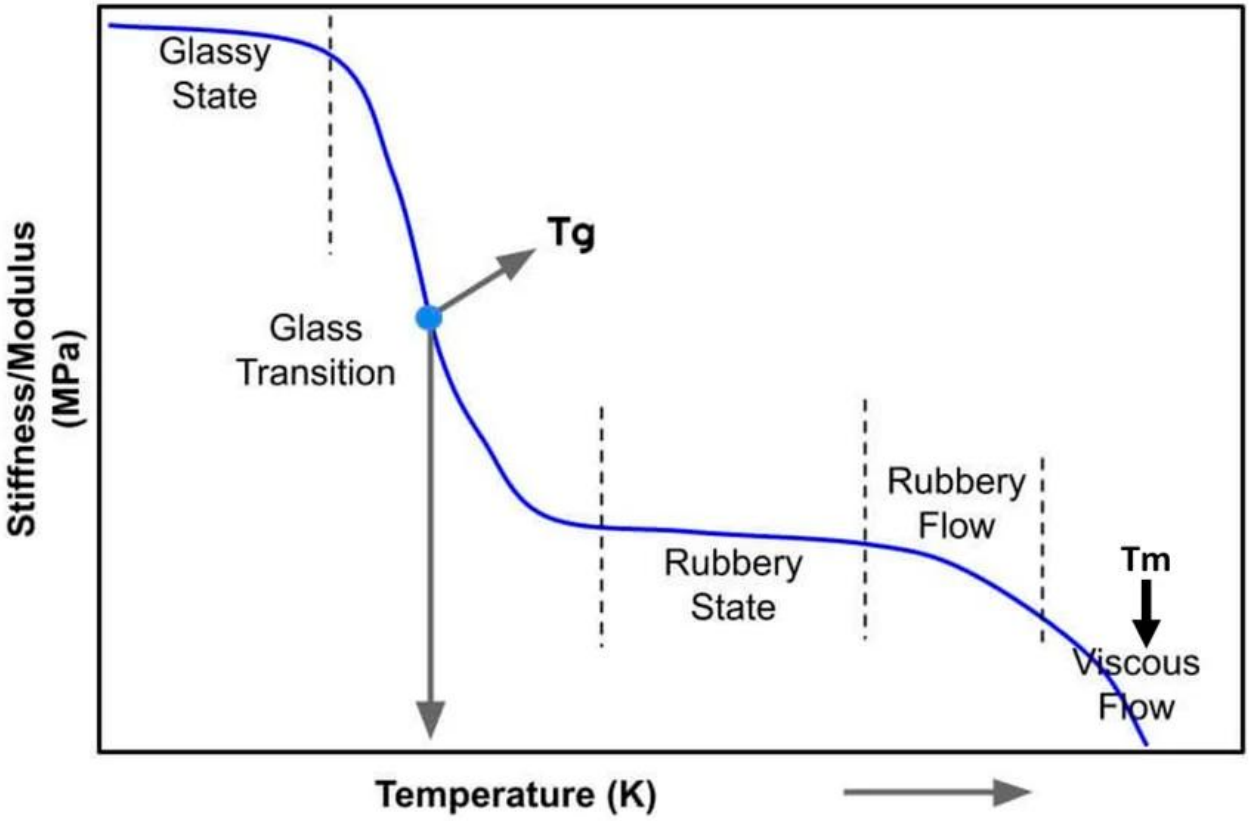
Summary and conclusions





Extrusion, injection, rotomoulding, casting, blowing….

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