prs Plastics Recycling Show EUROPE
5-6 May 2026 RAI, Amsterdam 10th ANNIVERSARY

Recycling solutions to improve sustainability of engineering plastics

Nico Esselin
5th May 2026

Silver Sponsor

Lotryl®40MA05T
We are Finalists
PLASTICS RECYCLING AWARDS EUROPE 2026

See us on Stand A130
Organised by GLOBAL POLYMER GROUP
PLASTICS RECYCLERS EUROPE

SK functional polymer

GOLD | Top 5%
ecovadis
Sustainability Rating
NOV 2025

SK Group Overview

❑ SK Group (SK)

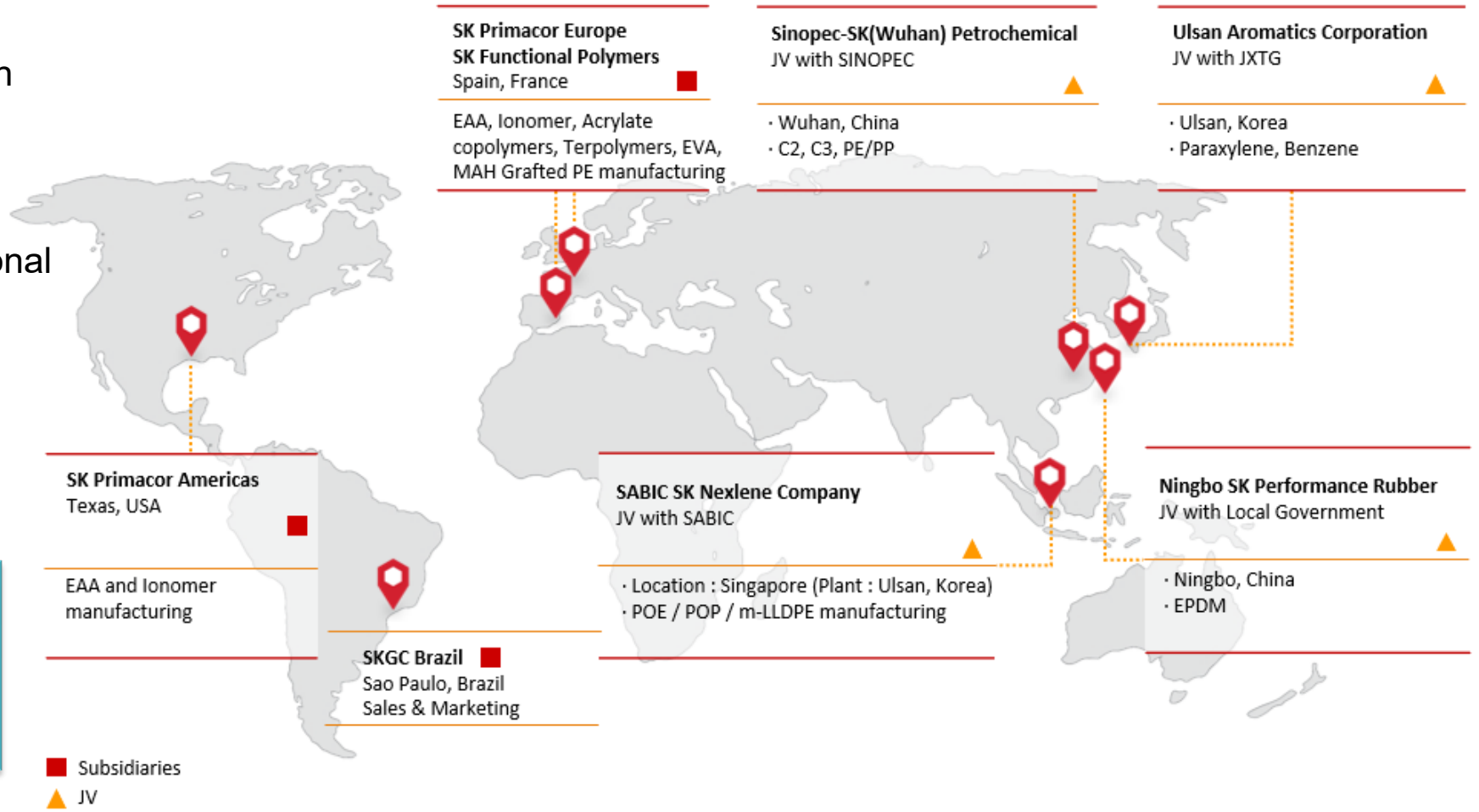
- Global company
- Annual revenue >$100 billion
- Headquartered in South Korea
- Driving ahead in Green, New Tech Materials, Bioscience and Digitalization
- 12 divisions where SK innovation holds SK geo centric & SK functional polymer

❑ SK Functional Polymer

- Production in Europe

- **LOTRYL®** (EA)
- **LOTADER®** (Terpolymer)
- **OREVAC ®**(MAH-G)
- **EVATANE®** (VA)

SK innovation | SK energy | SK geo centric | SK lubricants | SK incheon petrochem | SK trading international | SK ie technology | SK on | SK earthon



SK functional polymer products

LOTADER® T
LOTADER®

- Ethylene – Alkyl Acrylate – Maleic Anhydride (MAH)
- Ethylene – Alkyl Acrylate – Glycidyl Methacrylate (GMA)
- Ethylene – Vinyl Acetate – Maleic Anhydride (MAH)

→ Reactive Terpolymers

LOTRYL® T
LOTRYL®
EVATANE®

- Ethylene – Methyl or Butyl acrylate
- Ethylene – Vinyl Acetate

→ Ethylene Copolymers

High Pressure Polymerization

OREVAC®

MAH – Grafted | PE / PP / EVA

→ Grafted Polyolefins

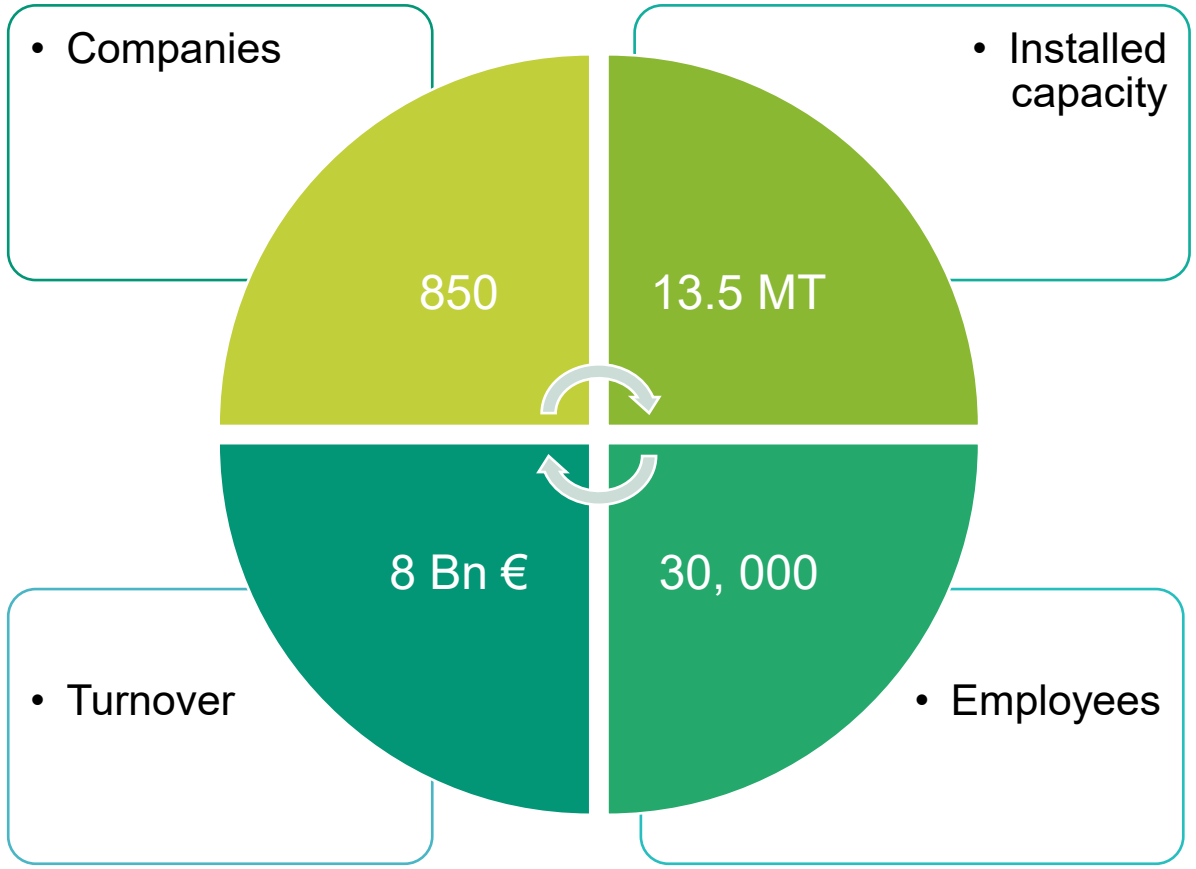
Reactive extrusion

LOTRYL BESTPEEL®

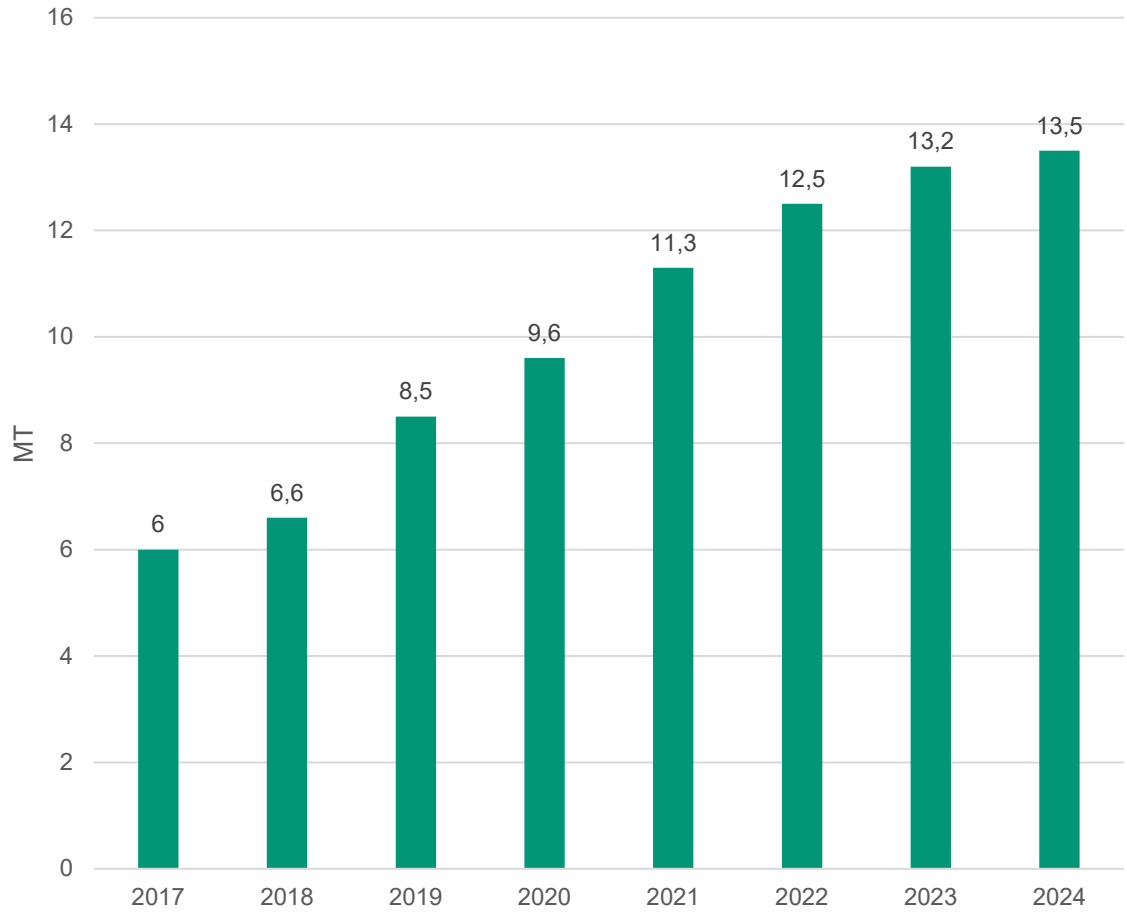
- Ethylene – Vinyl Acetate (EVA)
- Ethylene – Methyl Acrylate (EMA)

→ Easy Peel

European recyclers situation



Sources: Plastic recyclers Europe



Sources: Eurostat, Total Production [DS-056121]

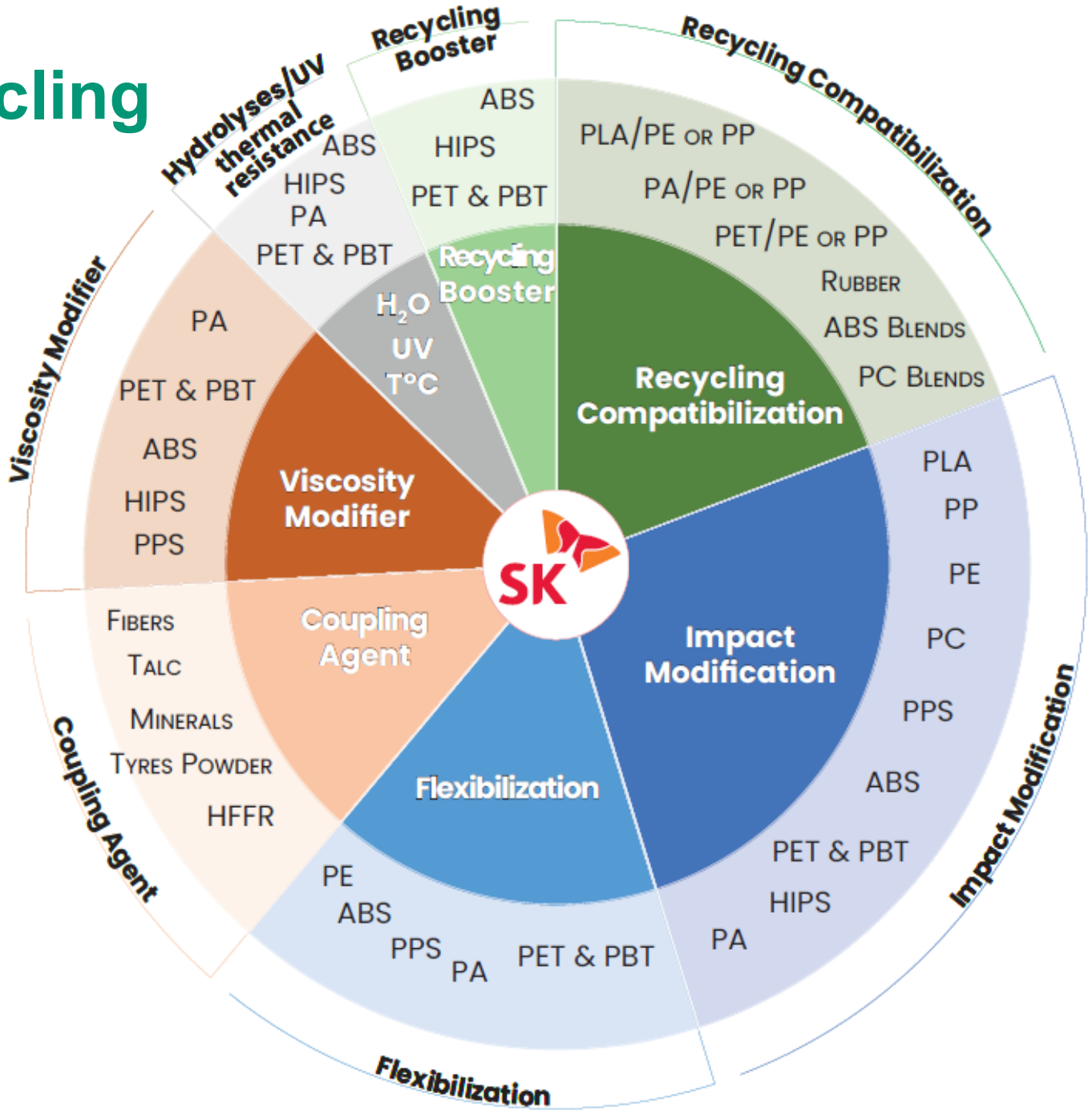
Why mechanical recycling needs performance boosters?

- **Plastics degradation during the lifetime of a product**
  - Exposition to chemicals or fuel
  - UV degradation
  - Temperature degradation
  - Mechanical strain
  - Pollution/contamination

- **Collection**
  - Recycled plastic often are blends of compatible resins with different performance
  - Poor performance plastic affects the performance of good performing ones

- **Sorting**
  - Sorting not 100% effective, ends up with contaminants in recycled feedstock
- **Reprocessing**
  - Degradation due to shear, temperature, moisture, UV

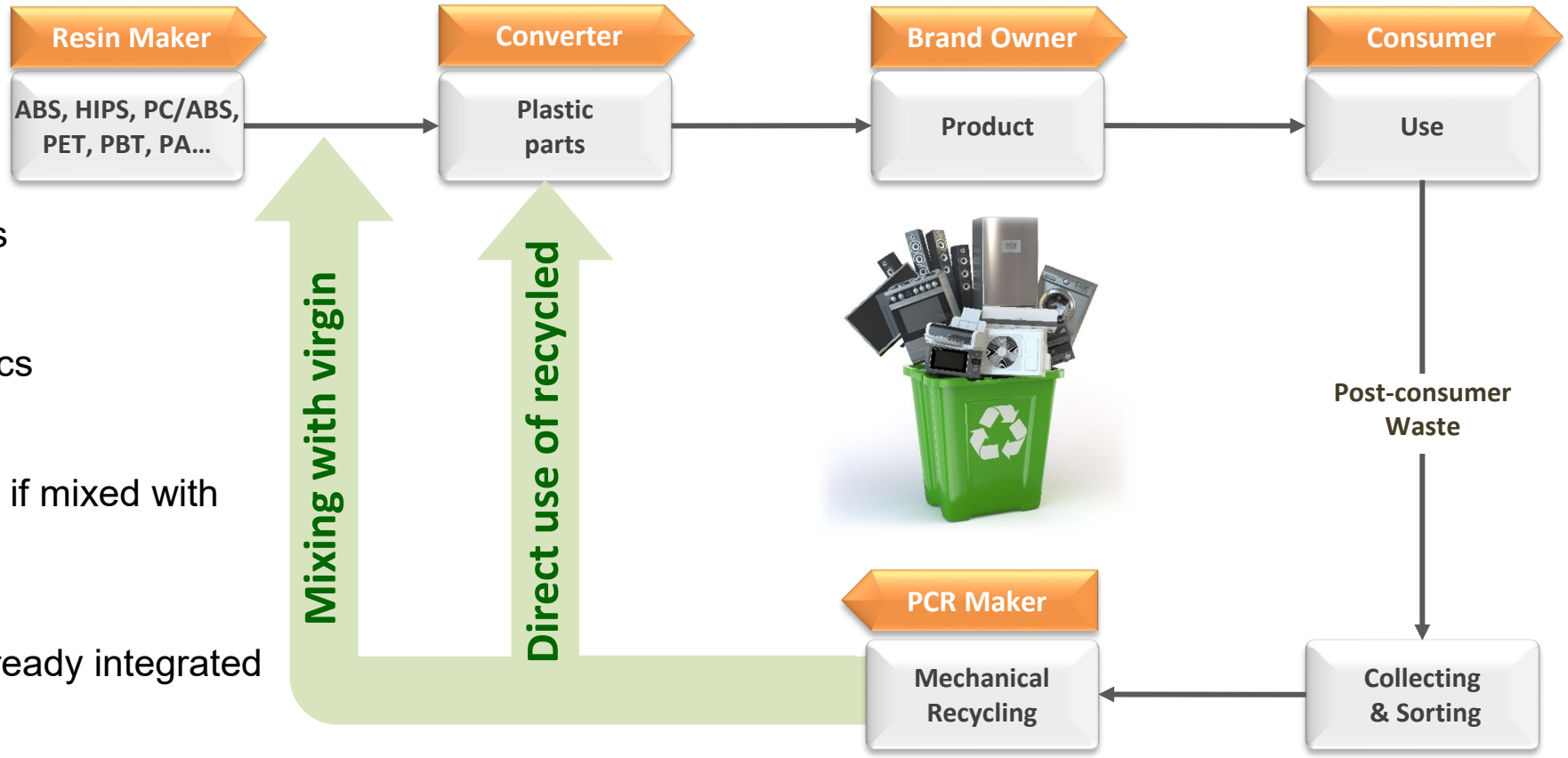
SKFP : solutions for Recycling



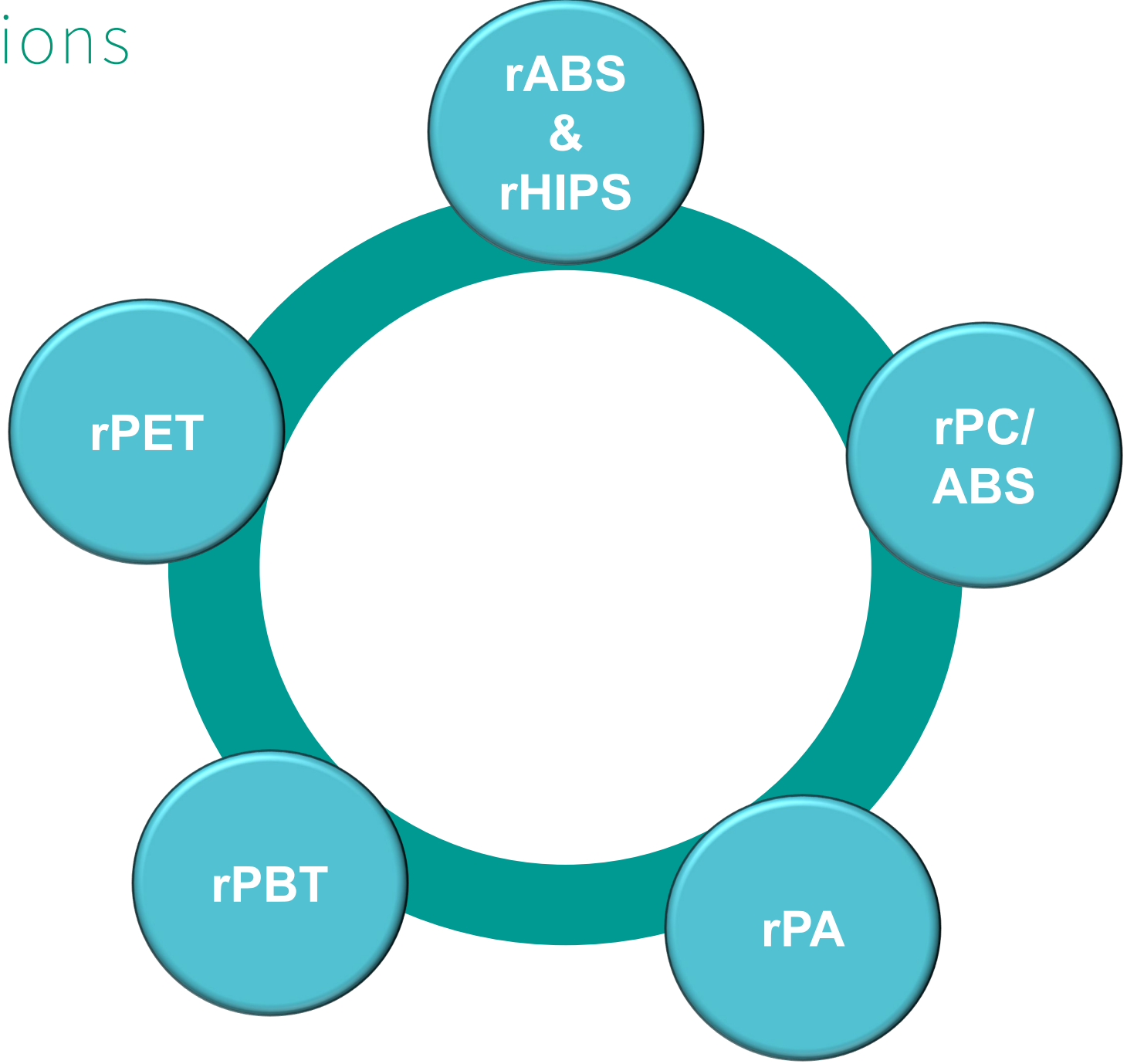
SKFP solutions for plastics recycled

➔ **LOTRYL®, LOTADER®, OREVAC® :** performance booster of recycled plastics

- Properties improvement of products
- Efficient up to 100% recycled plastics
- Allows increase of recycled content if mixed with virgin for specific applications
- End applications: where virgin is already integrated



SKFP solutions



rABS, rHIPS, rPC/ABS market

rABS & rHIPS

Impact modification

- **Lotryl® 29MA03T & 40MA05T**

Viscosity modification

- **Lotader® AX8900** (more viscous) & **Lotryl® 28BA700T** (more fluid)

Thermal Aging performances (90°C over 1000h)

- **Mechanical properties:**
  Lotryl® 29MA03T & 40MA05T (Room temperature)
  Lotryl®/Lotader® Blend at (-30°C)

•Optical properties:
Higher gloss retention: **Lotryl® 40MA05T**
Matting effect : **Lotader®/Lotryl®** blend

UV aging performances (UV exposure over 1000h)

- Maintaining the glossy properties : **Lotryl® 40MA05T**
- Matting effect : **Lotader® AX8900** or **Lotader®/Lotryl®** blend

Chemical resistance

- **Lotryl® 29MA03T** and **40MA05T**

rABS, rHIPS, rPC/ABS market

rABS & rHIPS

Improve recyclability over many cycles Vs competitive technology

- **Lotryl® 29MA03T & 40MA05T** and **Lotader®** blend

Maintain thermal properties : Vicat and Hdt not affected

- **Lotryl® 29MA03T & 40MA05T**

Low loading additives with High performances

- 3-5% wt loading

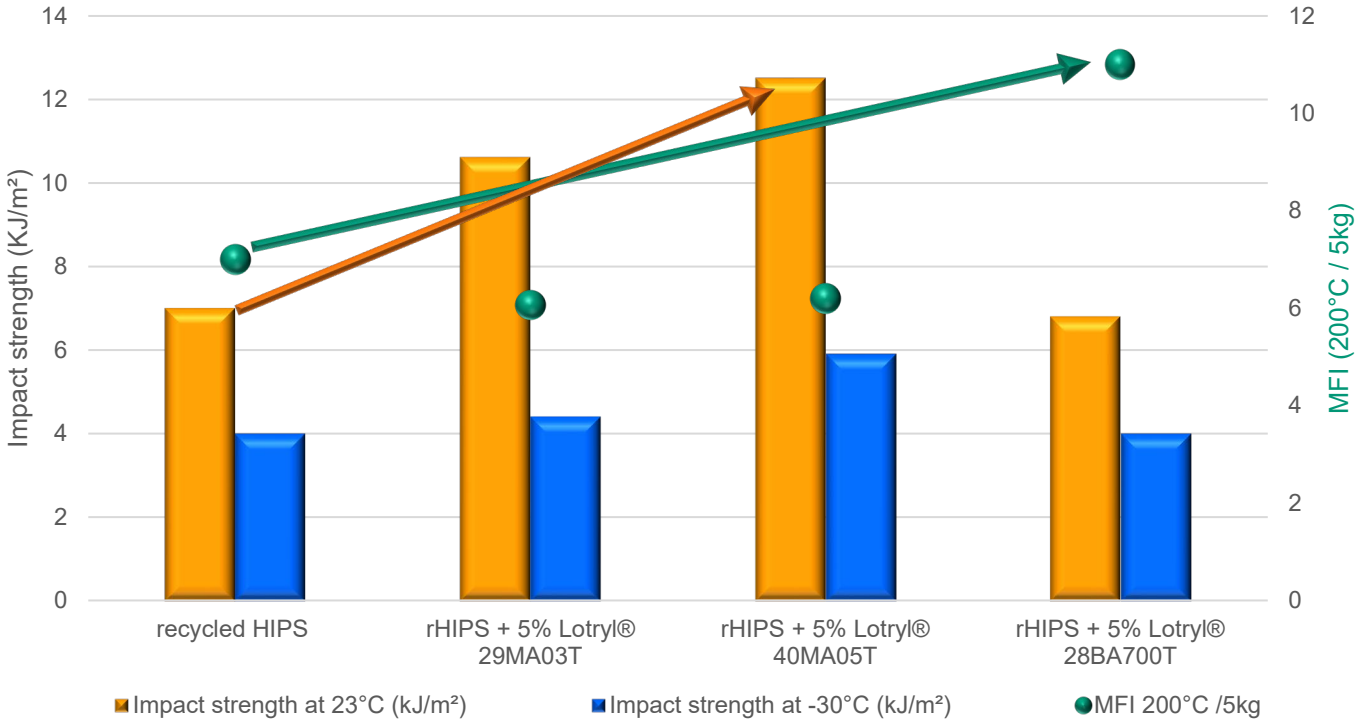
Performing in nearly all styrenic compound

- ABS & rABS
- HIPS & rHIPS
- PC/ABS and rPC/ABS

rHIPS: Impact & Fluidification

- Impact strength modifiers:
  - **Lotryl® 29MA03T & Lotryl® 40MA05T** increase the impact strength at room and cold temperature
- Viscosity modifiers:
  - **Lotryl® 28BA700T** decreases the viscosity

rABS & rHIPS



Low MFI value = Viscosity modifier
High MFI value = Flowability modifier

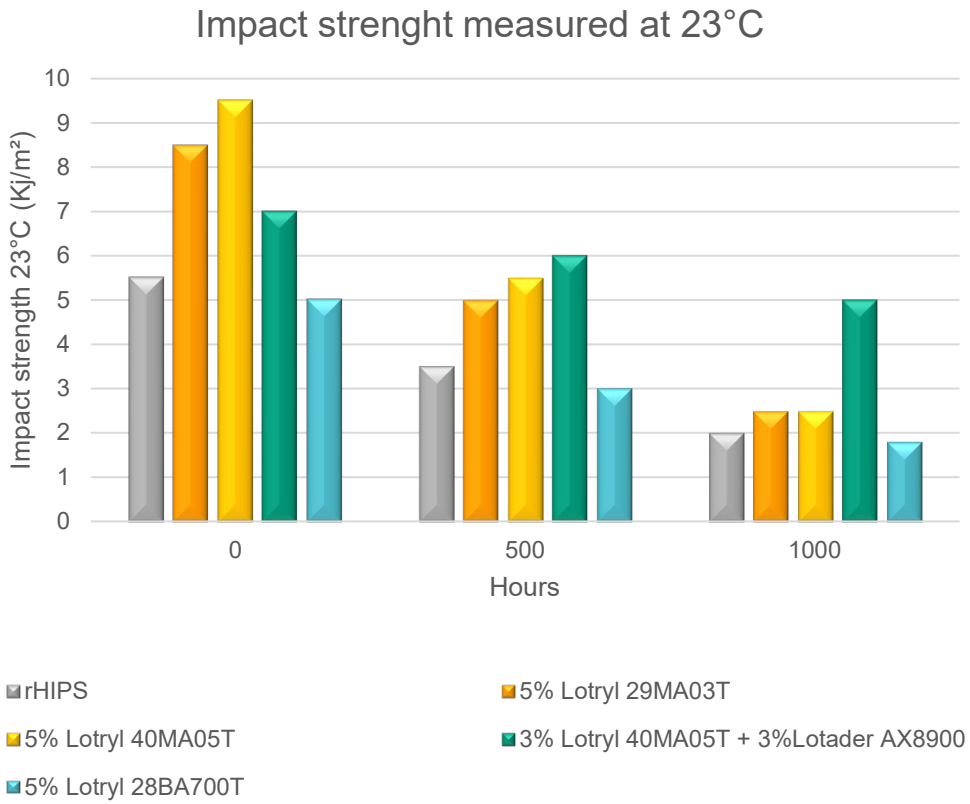
- Performance of (**Lotryl®29MA03T & 40MA05T/Lotryl® 28BA700T**) blend bring rHIPS properties close to the ones of virgin HIPS

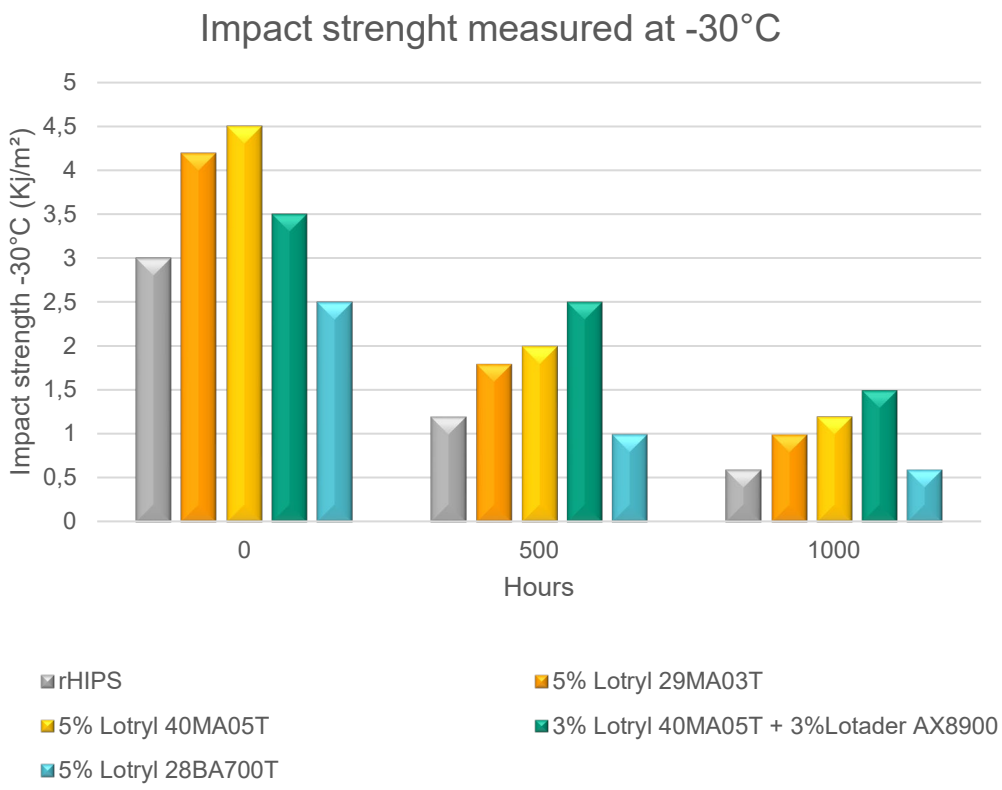
rHIPS after 1000 hours under 90°C exposure

Impact modification

- **Lotryl® 29MA03T, Lotryl® 40MA05T or the blend Lotryl® / Lotader® AX8900 boost** the mechanical **performance of** rHIPS over the time while other technologies are not stable.
- At room temperature, **Lotryl®** or the blend **Lotryl ® /Lotader ®** outperformed.
- At -30°C , the blend **Lotryl ® /Lotader ®** seems to be the best option.

rABS & rHIPS

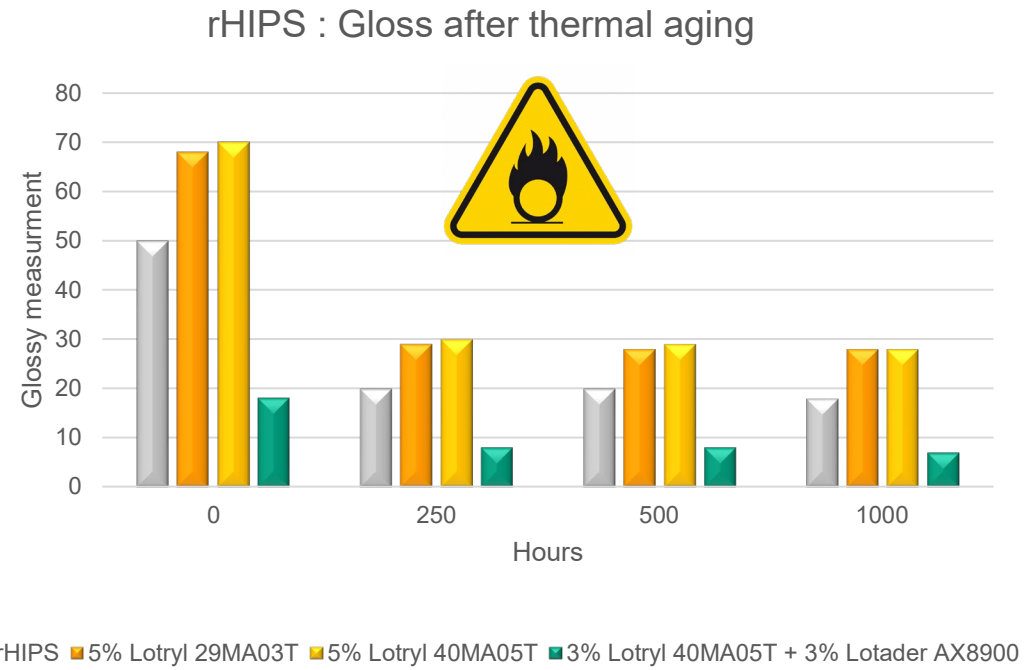


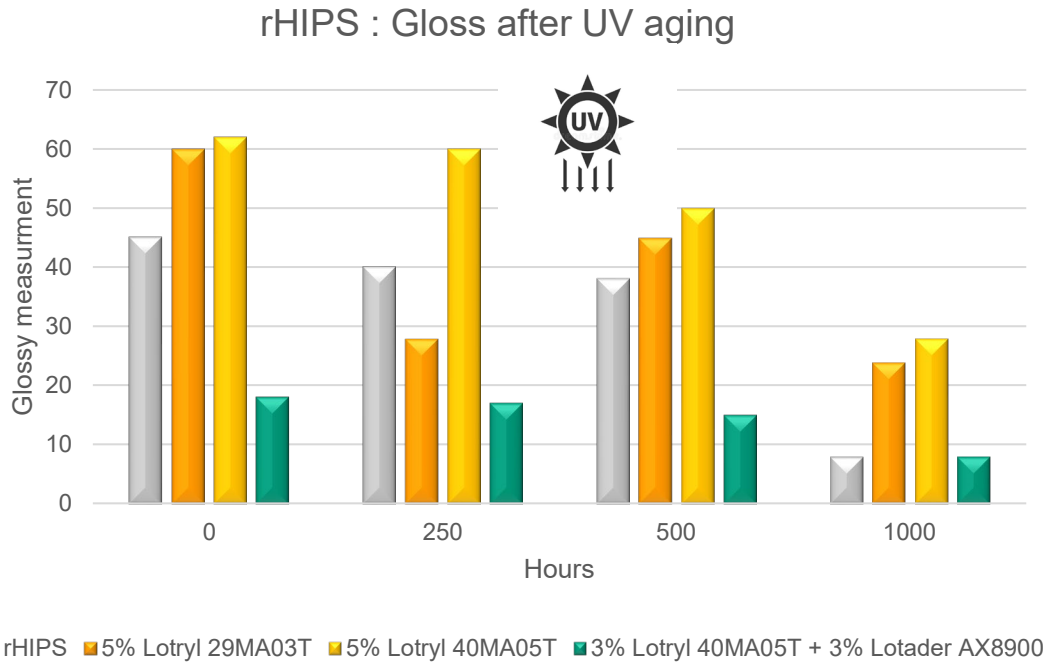


Gloss retention after thermal and UV exposure (1000 h)

- Evaluation of the glossy properties under UV and thermal (90°C) exposure for 1000 hours

rABS & rHIPS





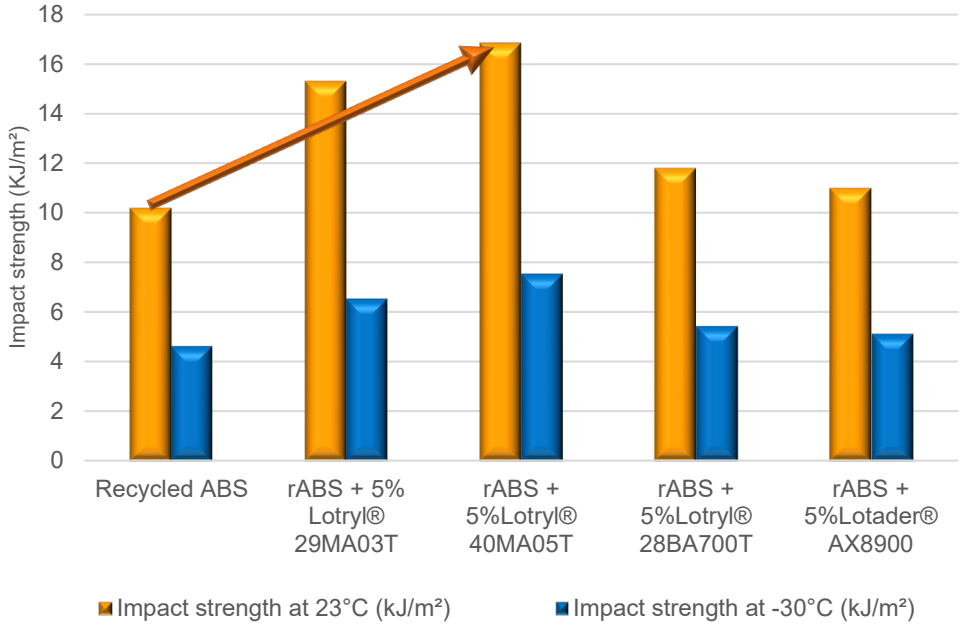
Conclusions :

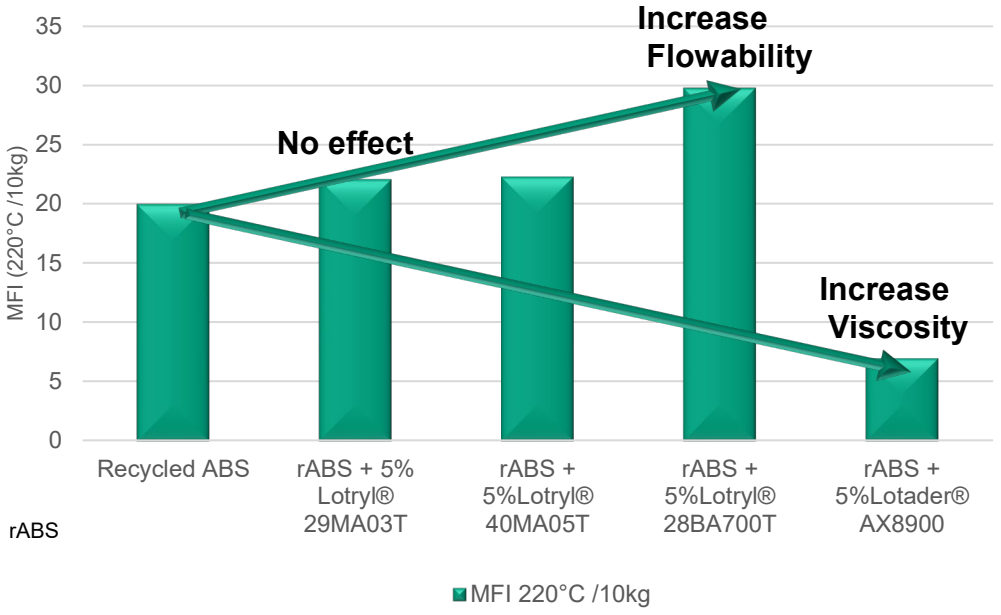
- After UV aging, **Lotryl ®** can maintain high gloss longer.
- Under Thermal condition, **Lotryl ®** improves the gloss Vs rABS without additive
- At the opposite, **Lotader ®** makes rHIPS more matt.

rABS solutions
Impact / Viscosity modification

- Impact strength modifiers:
  - **Lotryl® 29MA03T** & **Lotryl® 40MA05T** increases the impact strength at room and cold temperature
- Viscosity modifiers:
  - **Lotryl ® 28BA700T** decreases the viscosity
  - **Lotader® AX8900** increases it

rABS & rHIPS



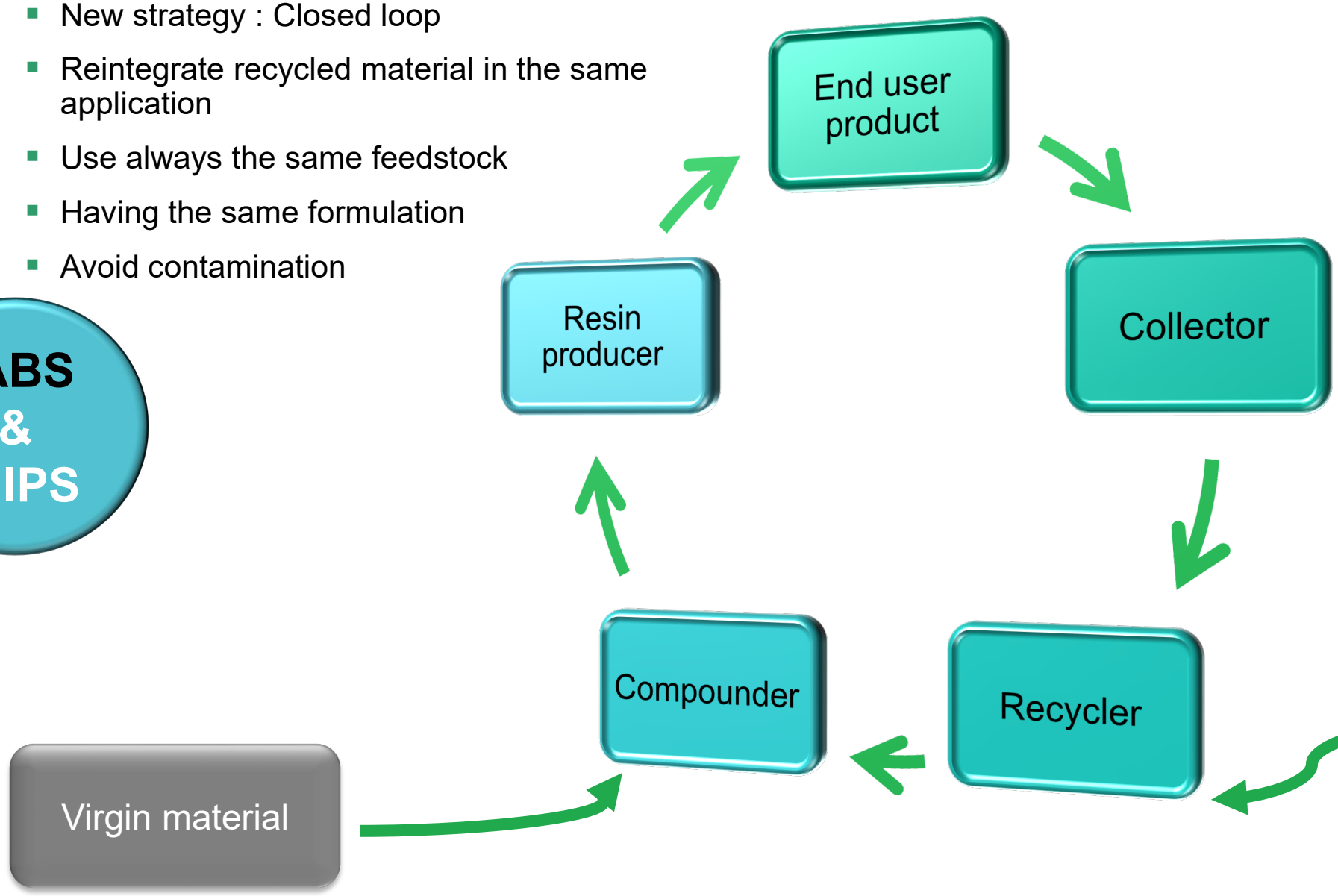


- Performance of the blend **Lotryl® 29MA03T or Lotryl® 40MA05T** with rABS is similar than with virgin ABS
- Allows increase of rABS content in virgin ABS for specific applications (done with 50 and 70% rABS)

rABS closed recycling loop

- New strategy : Closed loop
- Reintegrate recycled material in the same application
- Use always the same feedstock
- Having the same formulation
- Avoid contamination

rABS & rHIPS



Material can be recycled few times

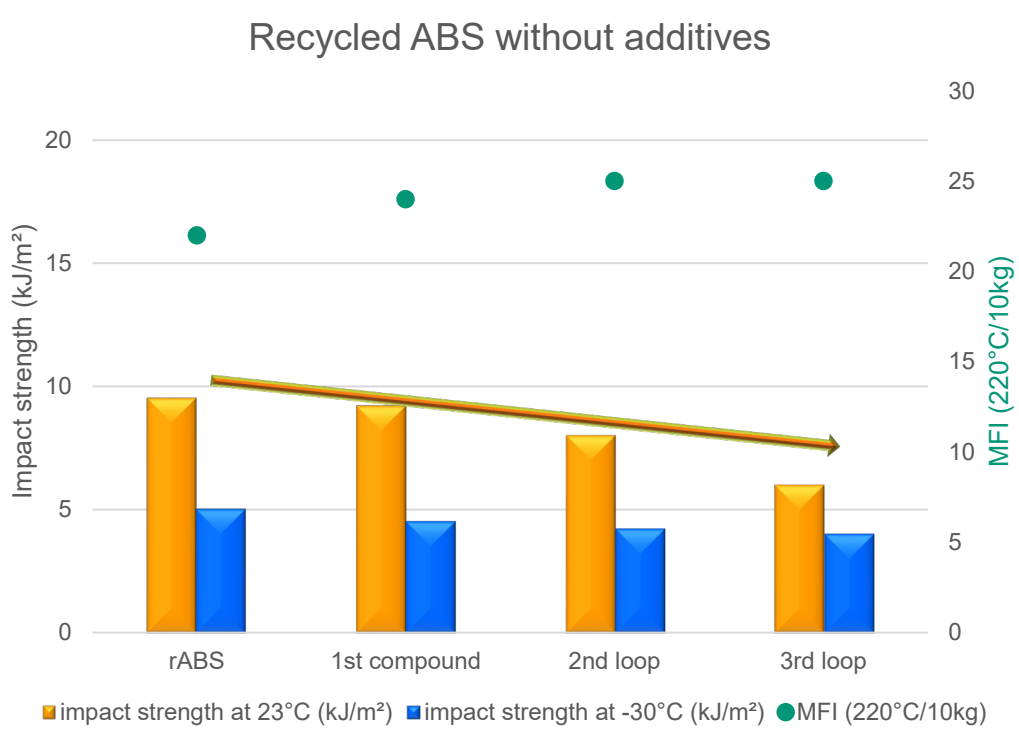
LOTADER®
LOTRYL®
OREVAC ®

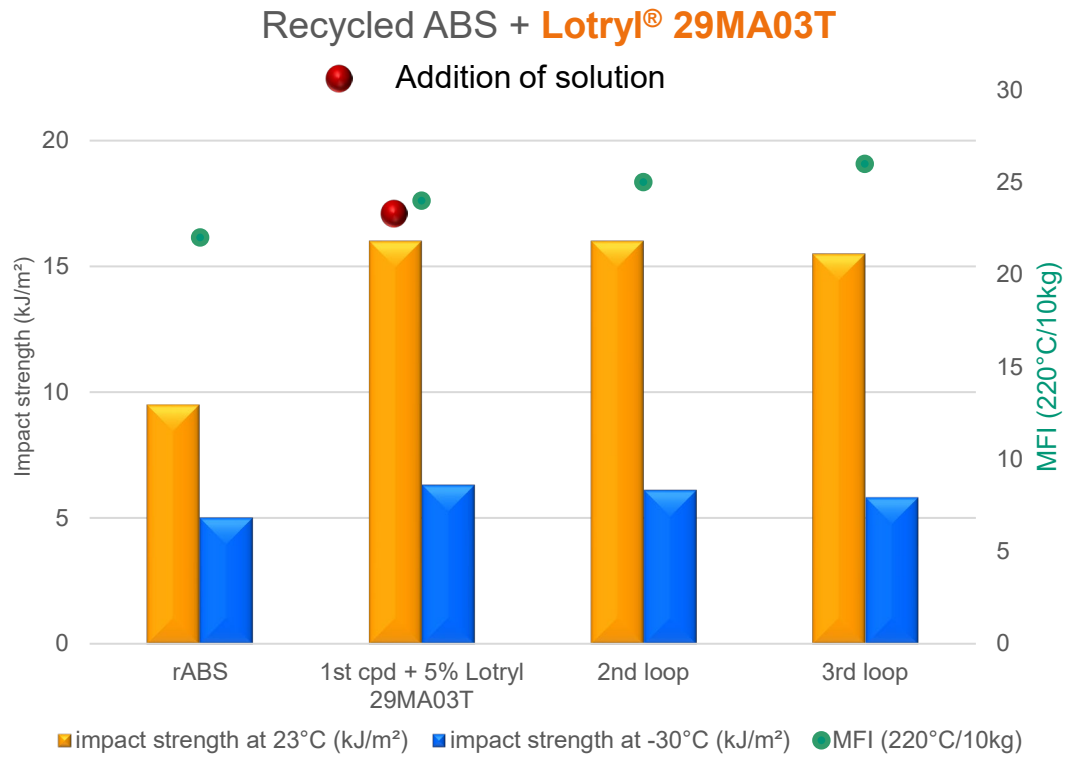
rABS Multi cycle of recycled process

Impact / viscosity evaluation

- rABS without additives lose their mechanical performance after few loops of compounding
- When **Lotryl® 29MA03T** is added to rABS, it maintain good properties after few loops

rABS & rHIPS





- The first challenge is to maintain the high properties when SKFP solutions is integrated into recycled feedstock.
- Lotryl helps to maintain toughness (more than 80% impact strength)

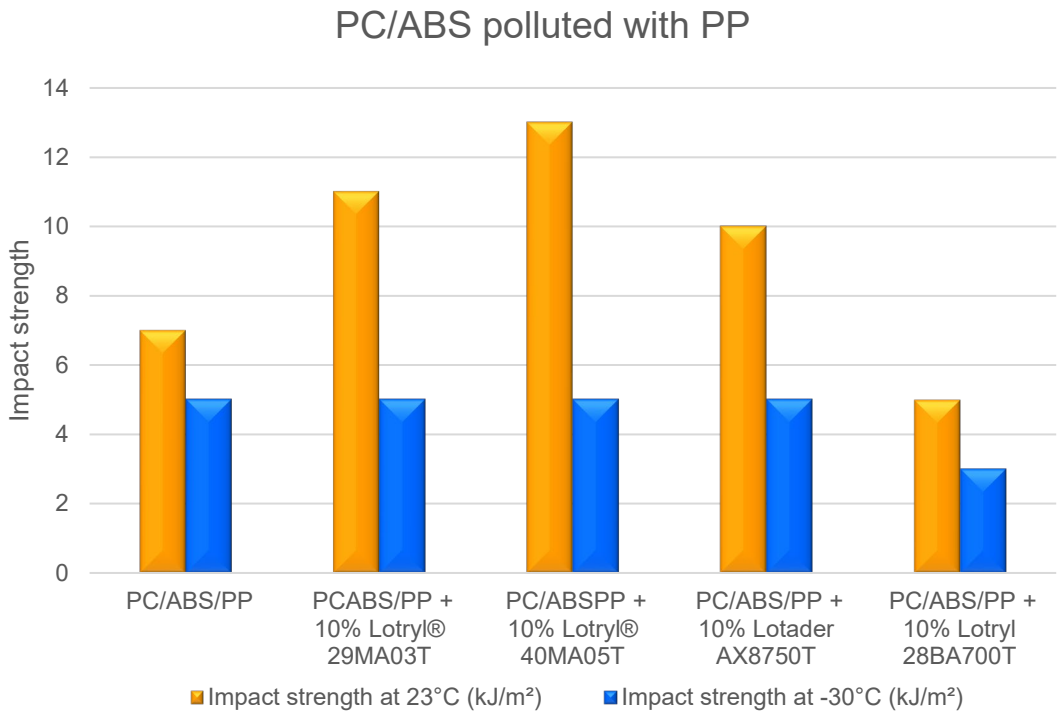
Lotryl® T copolymers in PC/ABS alloys

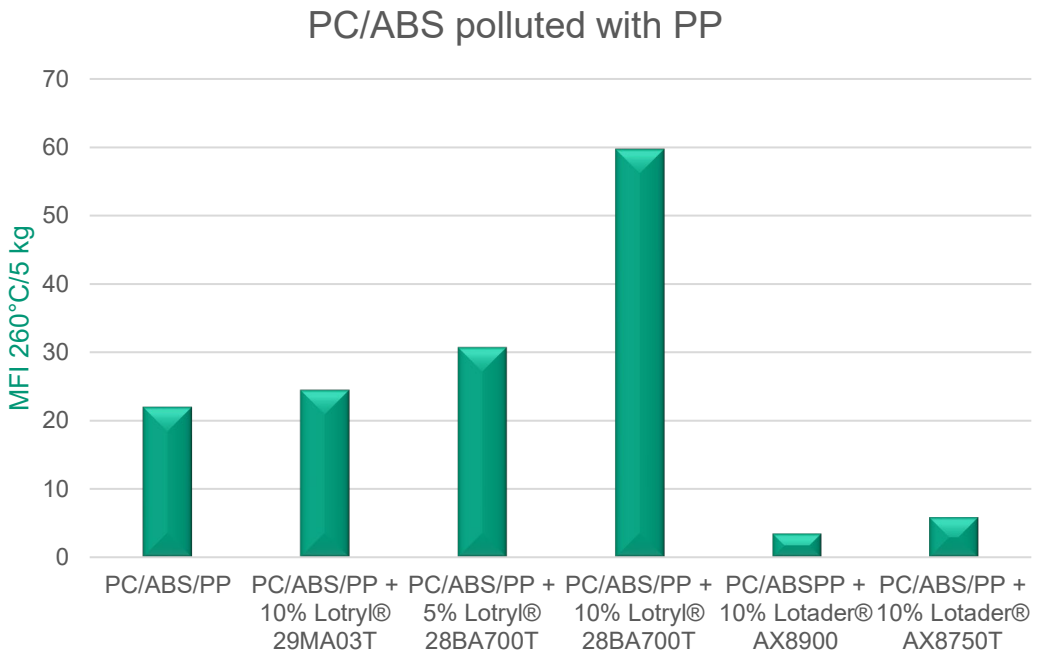
Impact / rheology modification

Compatibilization enhancement

- Toughness improvement obtained with only 5-10% of **Lotryl® 29MA03T, Lotryl® 40MA05T**
- Viscosity is not impacted with PC/ABS/ **Lotryl® 29MA03T, Lotryl® 40MA05T** (5-10%)
- Rheology modificationin PC/ABS with **Lotryl® 28BA700T, Lotader® AX8750T, Lotader® AX8900** (5-10%)

rPC/ ABS





Thanks to its high polarity, **Lotryl®** can be used in ABS and PC/ABS as a general-purpose toughener

SKFP additives for rPA compounds (rPA/PE, rPA/PP, …)

rPA

PA/PP tubing in automotive

Because of their non-compatibility, when PA is polluted with PP, mechanical properties such as impact strength or viscosity don't allow the material to have high value

SKFP solutions:

- rPA not homogeneous : **Orevac®** for **compatibilization**
- rPA brittle at -20° C as at room temperature : **Orevac®** for **impact resistance**
- **Prevent hydrolysis** : **Orevac®** due to its Chemicals binding.

PA/PE from fisher nets

Not sutable for relevent application due to an issue of compatibility, PA poluted PE with no additives have mechanical properties challenges such as the impact strenght, the viscosity or the compatibilization.

SKFP solutions:

- rPA not homogenious : **Lotader®** for **compatibilization**
- rPA brittle at -20° C as at room temperature : **Lotader®** for **impact resistance**
- **Lotader® prevent hydrolysis.**

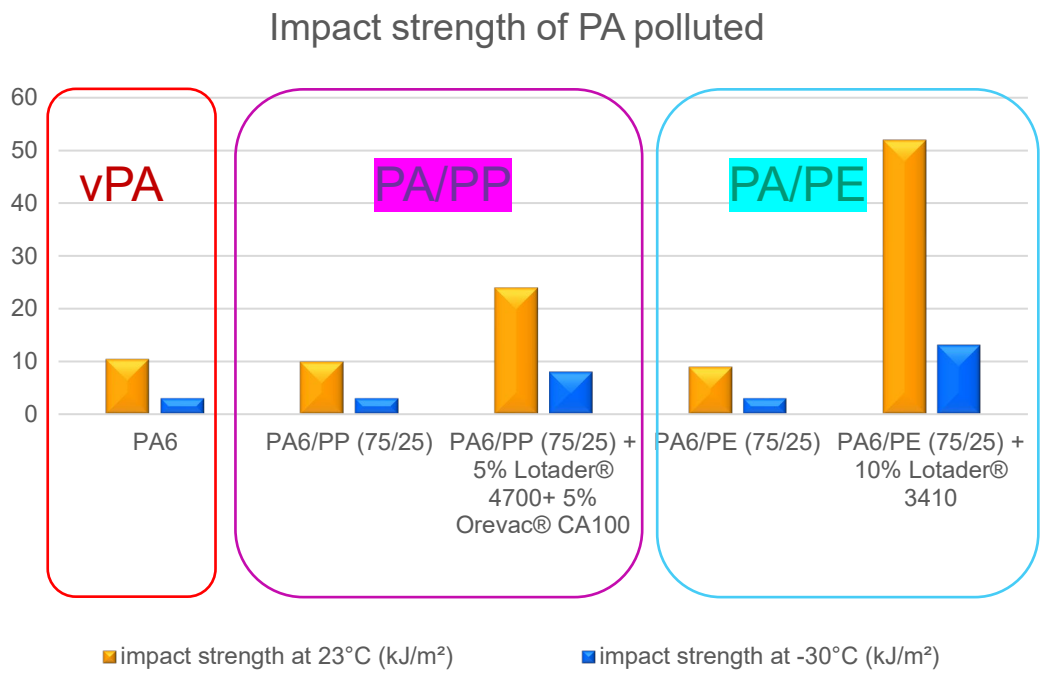
Compatibilization of PA6/PP and rPA/PE

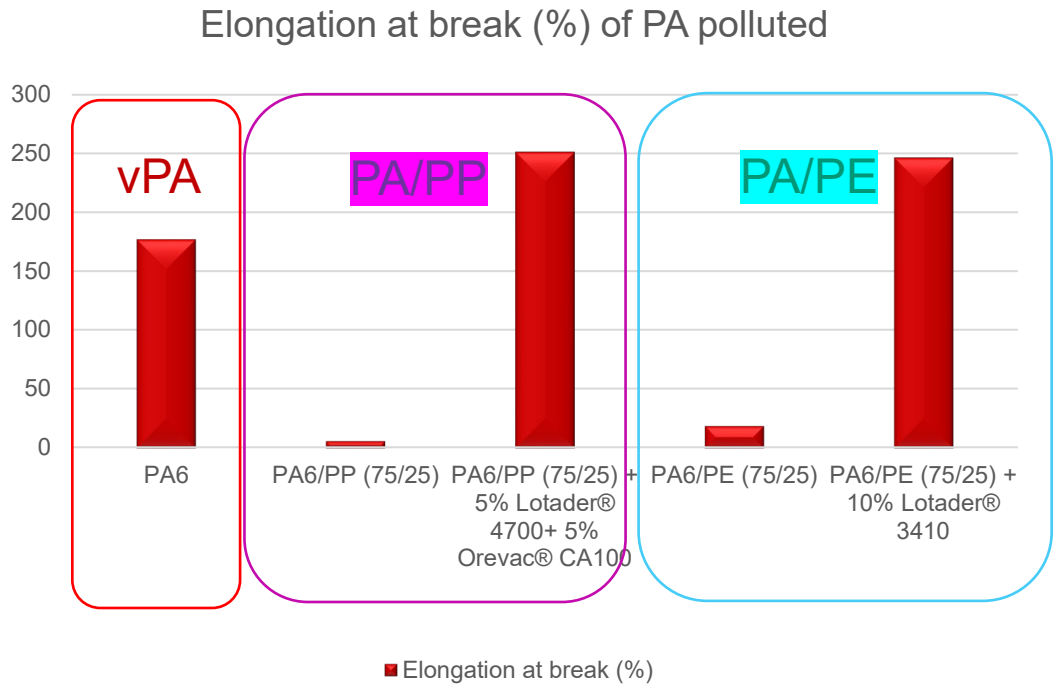
Impact / Elongation at break

- Impact strength modifiers at 23° C and -30° C :
  - A blend **Orevac® CA100** + **Lotader® 4700** in PA/PP and **Lotader® 3410** in PA/PE increase the impact strength at room and cold temperature to a level higher than virgin PA6

- Elongation at break to evaluate the compatibilization :
  - A blend **Orevac® CA100** + **Lotader® 4700** in PA/PP and **Lotader® 3410** in PA/PE improve the compatibility to reach the performance of virgin PA6

rPA

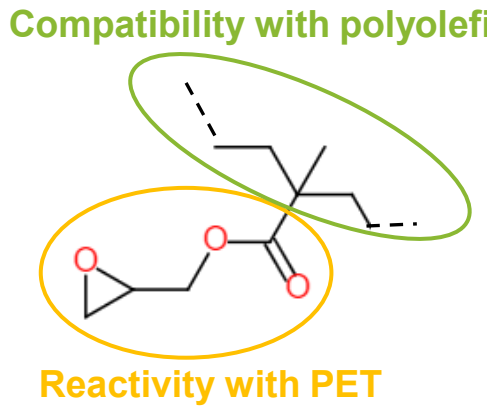




- Improve significantly the impact properties while maintaining the mechanical properties of the major component of the blend

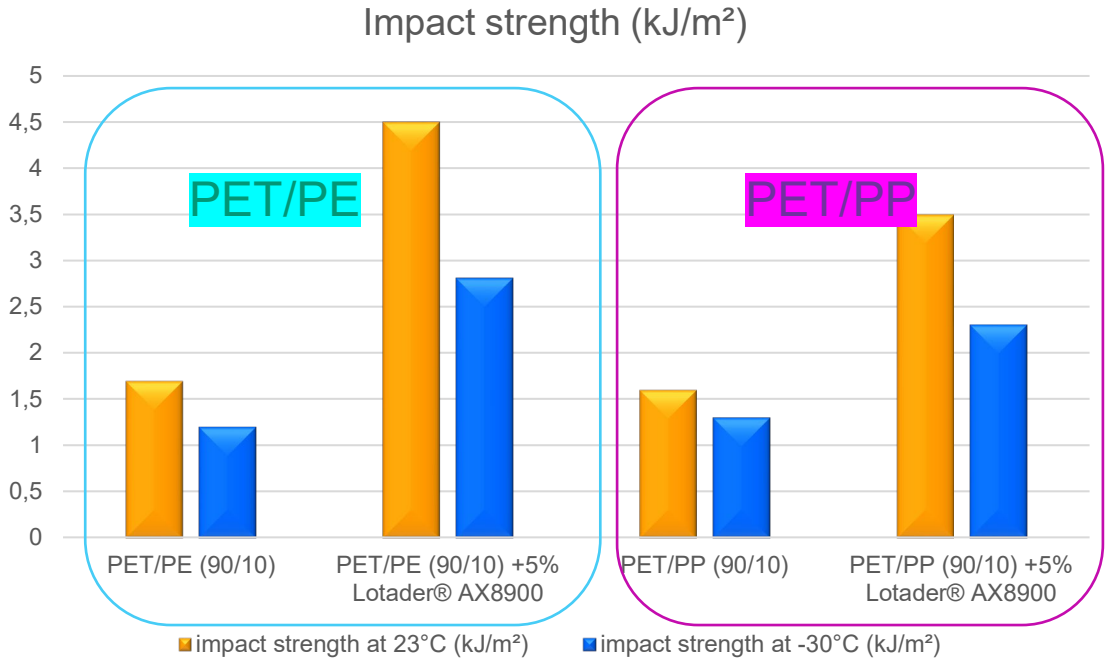
Compatibilization of rPET/PE and rPET/PP

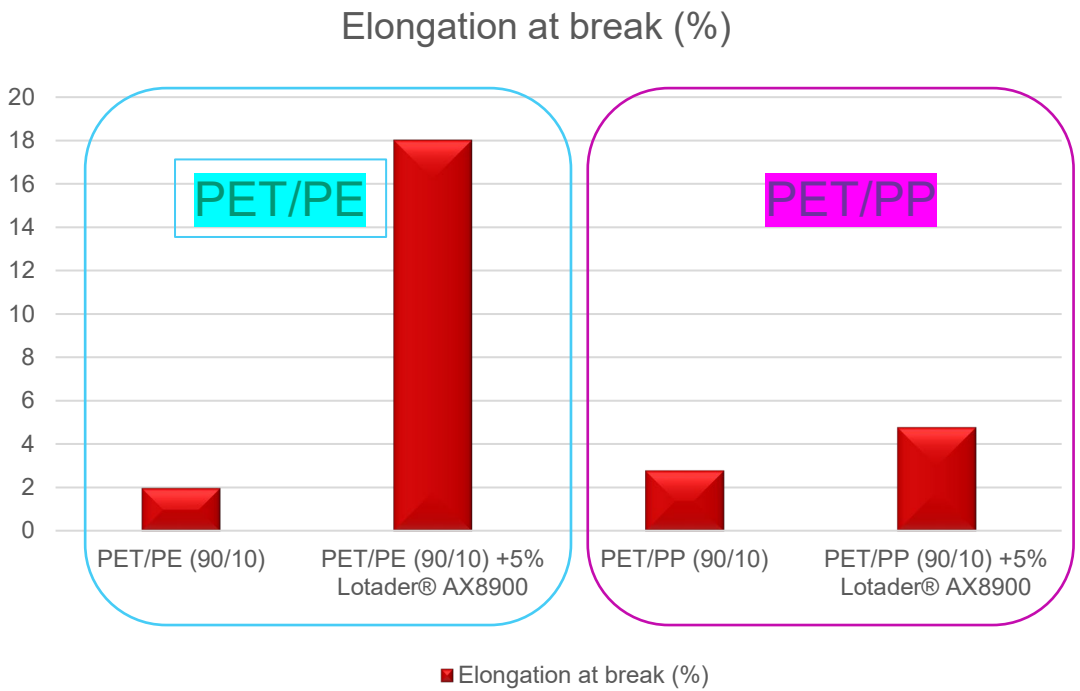
Impact / Elongation at break



- Impact strength modifiers at 23° C and -30° C :
  - **Lotader® AX8900** increase the impact strength at room and cold temperature
- Elongation at break :
  - **Lotader® AX8900** increase the compatibility

rPET





- Performance of **Lotader® AX8900** with rPET blend is similar than with virgin PET
- Allow to use contaminated or blend rPET

SKFP additives for polyesters compounds (rPET/PE, rPET/PP, rPET packaging…)

rPET

- **CPET/rCPET ovenable trays for frozen food**

  The trays must resist up to 180° C temperature in conventional oven

  SK FP solutions:

  - cPET britlle at -20° C : need Lotryl® for **impact resistance**
  - cPET poor melt strength (= visco) : Lotryl® **+** Lotader® to **increase melt strength**

Pigmented rPET trays for refrigerated food

Lots of recycled APET available

Trays not for cooking : does not need themperature resistance

SK FP solutions:

- Recycled PET have degraded properties : additives such as Lotryl® &Lotader® required to **resist impact at refrigerated T (4° C)** and **adjust rheology**

Hydrolyses prevention of PBT

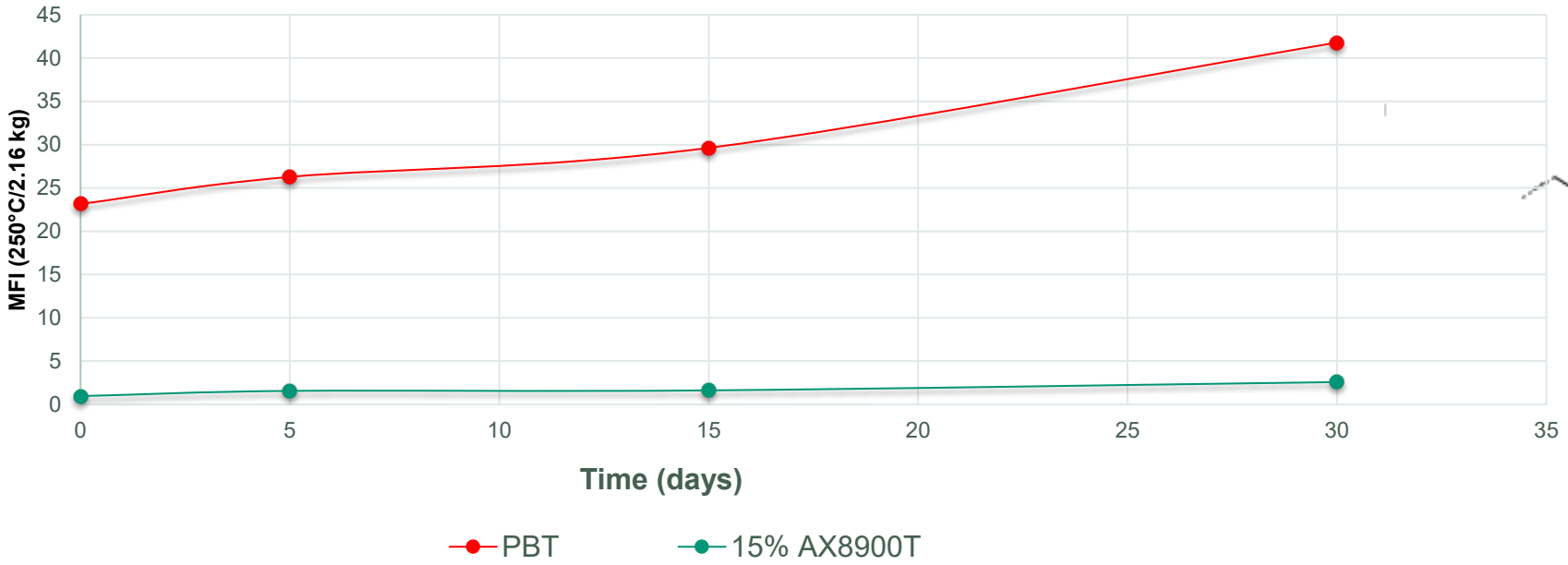
Viscosity and mechanical performances maintained

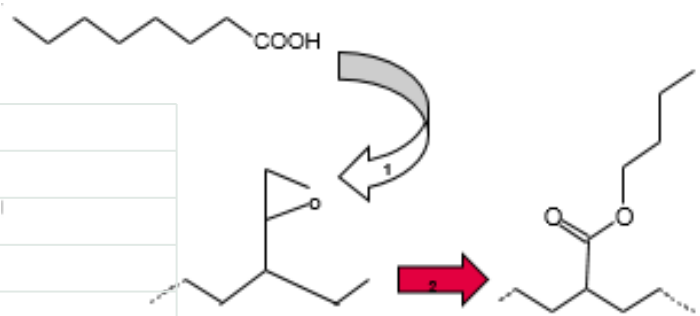
- PBT (polybutylene terephthalate) hydrolysis leads to polymer chain scission, resulting in molecular weight reduction and a significant loss of mechanical properties, melt strength and toughness.

- **Lotader® AX8900T** acts as viscosity modifier and prevent hydrolysis over water exposure which could suppose to improve the quality of rPBT

PBT

Hydrolyses performances of Lotader® A8900T





- Performance of **Lotader® AX8900T** with PBT after 1 month exposure in water bath
- **Lotader® AX8900T** is the new technology released in 2026 and already available commercially.

Mechanical recycling PE/EVOH

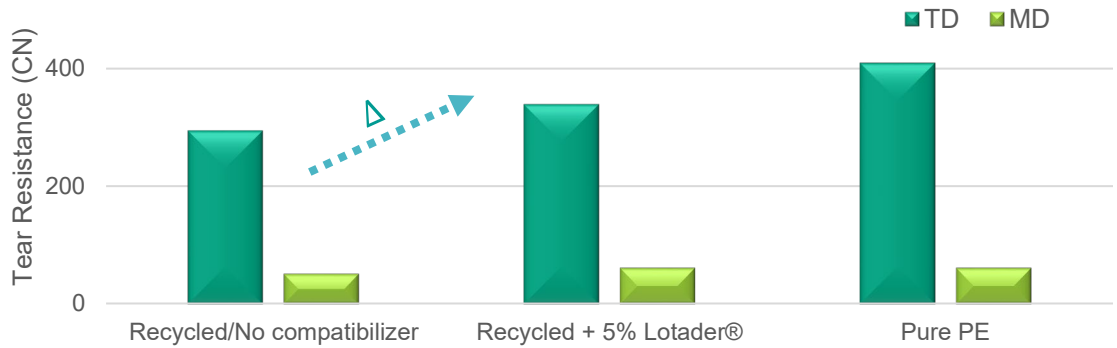
- **Recycling barrier films (PE/EVOH)**

Structure: PE/Tie layer/EVOH/Tie layer/PE

i.e. PE: 89%, EVOH 10%, **Orevac®** 1%

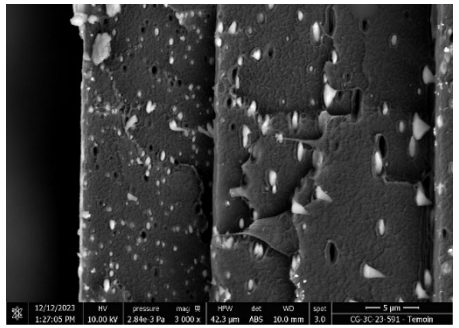
- **Tear strength**

Significant tear resistance improvement with addition of 5% Lotader® 4210

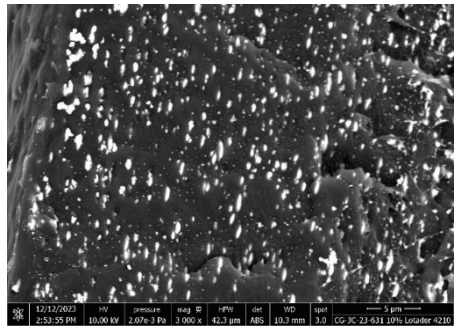


❑ **Morphology:** EVOH dispersion in PE

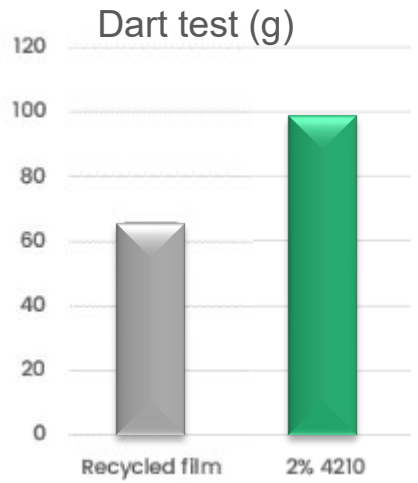
Non Compatibilized



+ Lotader® 4210



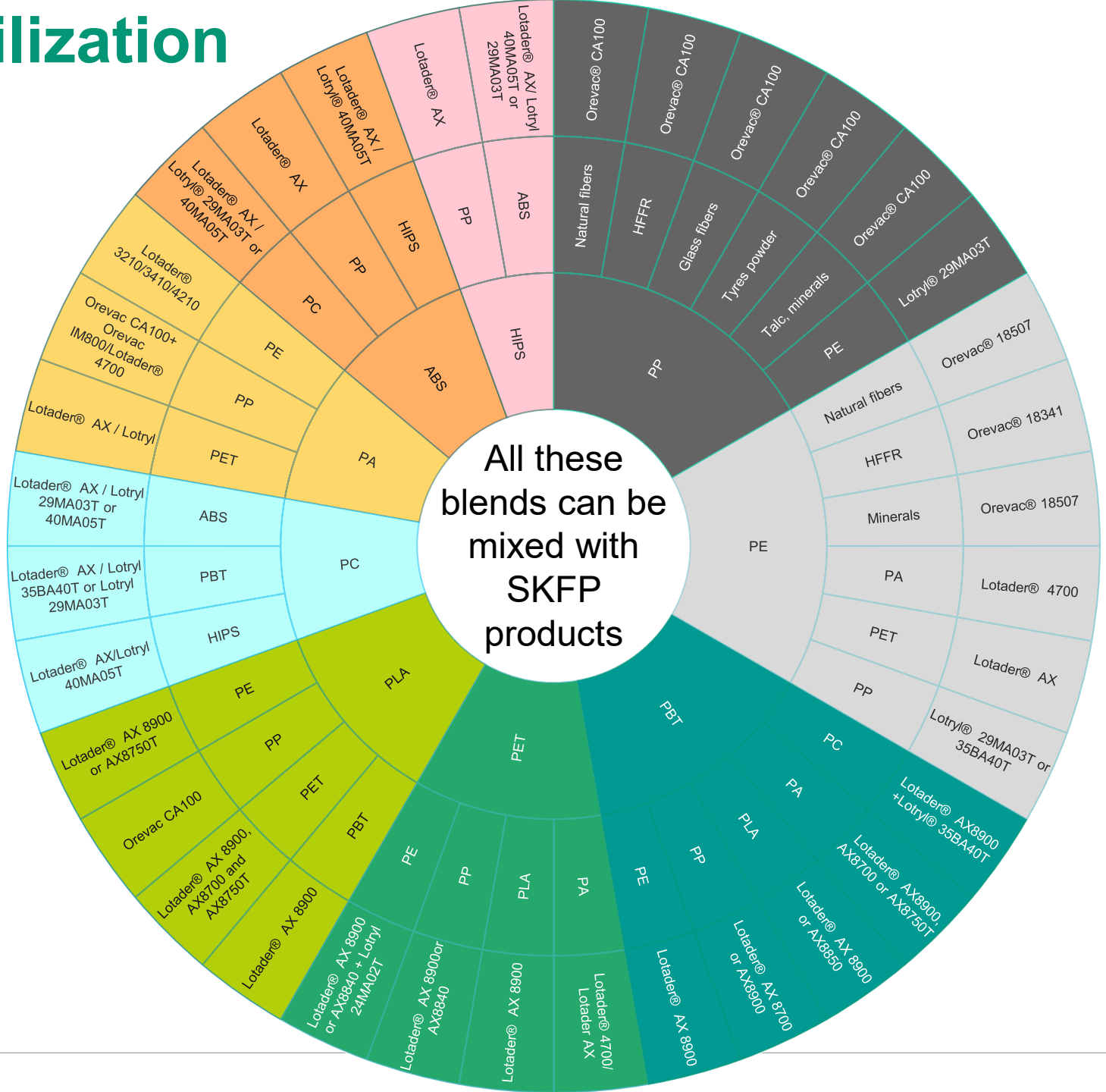
- **Dart test:** measurement result is the weight at which film fracture begins



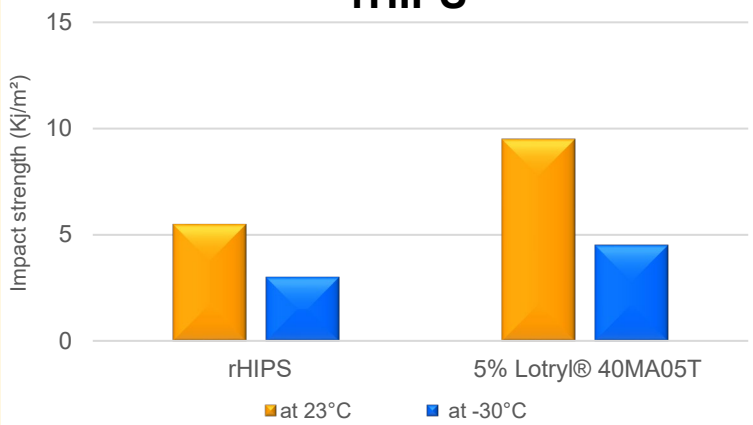
[#1]Typical compatibilizer loading recommendations for PE/EVOH films: from 2 to 5% depending on the EVOH content

[#2]For PA-based barrier films, it is recommended to compound it with virgin PE. Lotader® 4210 added at 0.75% in the recycled/virgin blend enables to retrieve many of the original properties of virgin PE

Compatibilization

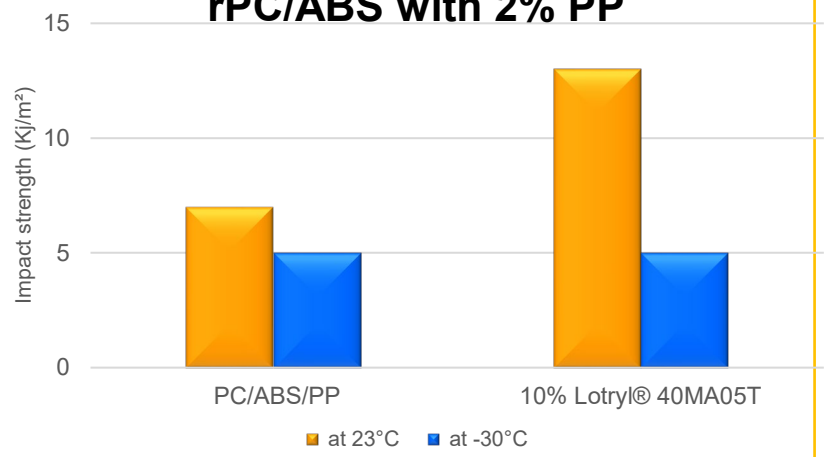


rHIPS



- Effective impact modifier.
- Improve compatibilization with rABS, rPC and PP, PE residual
- Maintain gloss after thermal (90°C) and UV ageing (1000 h)
- Low loading additives with high performances

rPC/ABS with 2% PP



- High impact modification.
- Improve compatibilization with PP and PE residual
- Outstanding softness and flexibility

We are Finalists

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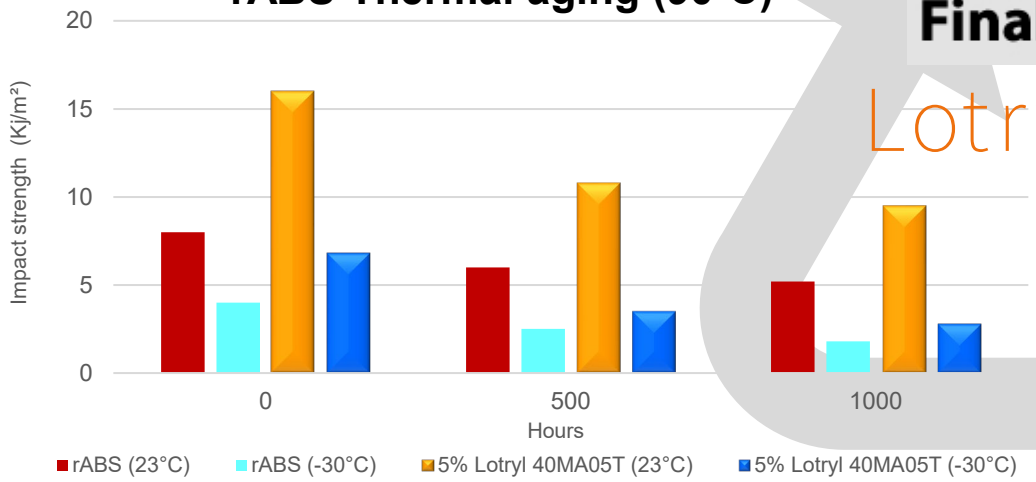
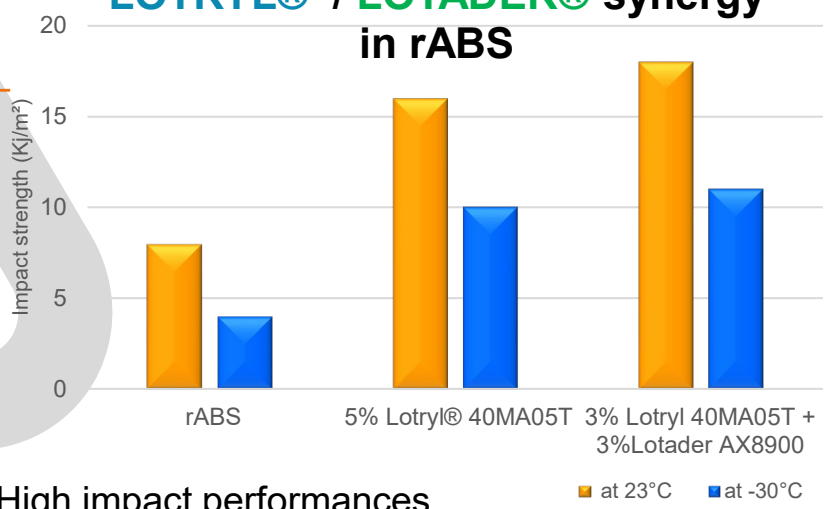
Lotryl® 40MA05T

rABS Thermal aging (90°C)



- Effective impact modification.
- Gloss retention after thermal (90°C) and UV ageing (1000 h)
- Low loading but high performances

LOTRYL® / LOTADER® synergy in rABS



- High impact performances.
- Viscosity modifier
- Improve recyclability over many cycles

Conclusion

- **SK functional polymer** presented multiple solutions to bring recycled materials to the same quality than virgin ones
- **SK functional polymer** supporting recyclers and compounders by using solutions to improve sustainability
- Mechanical Recycling reuse material for second life and need compatibilizers, impact modifiers, coupling agents such as **LOTRYL®, LOTADER® & OREVAC®**
- **SK functional polymer** have a target for GREEN: to become the global first booster solutions provider to recycling plastics (rABS, rHIPS, rPC/ABS…)

SK functional polymer

Thank you!