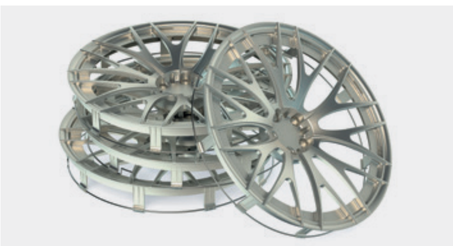
Polymers

Calcium carbonate in engineered materials

Sustainable excellence



THINKING OF TOMORROW

Engineered calcium carbonate solutions for enhanced polymer performance

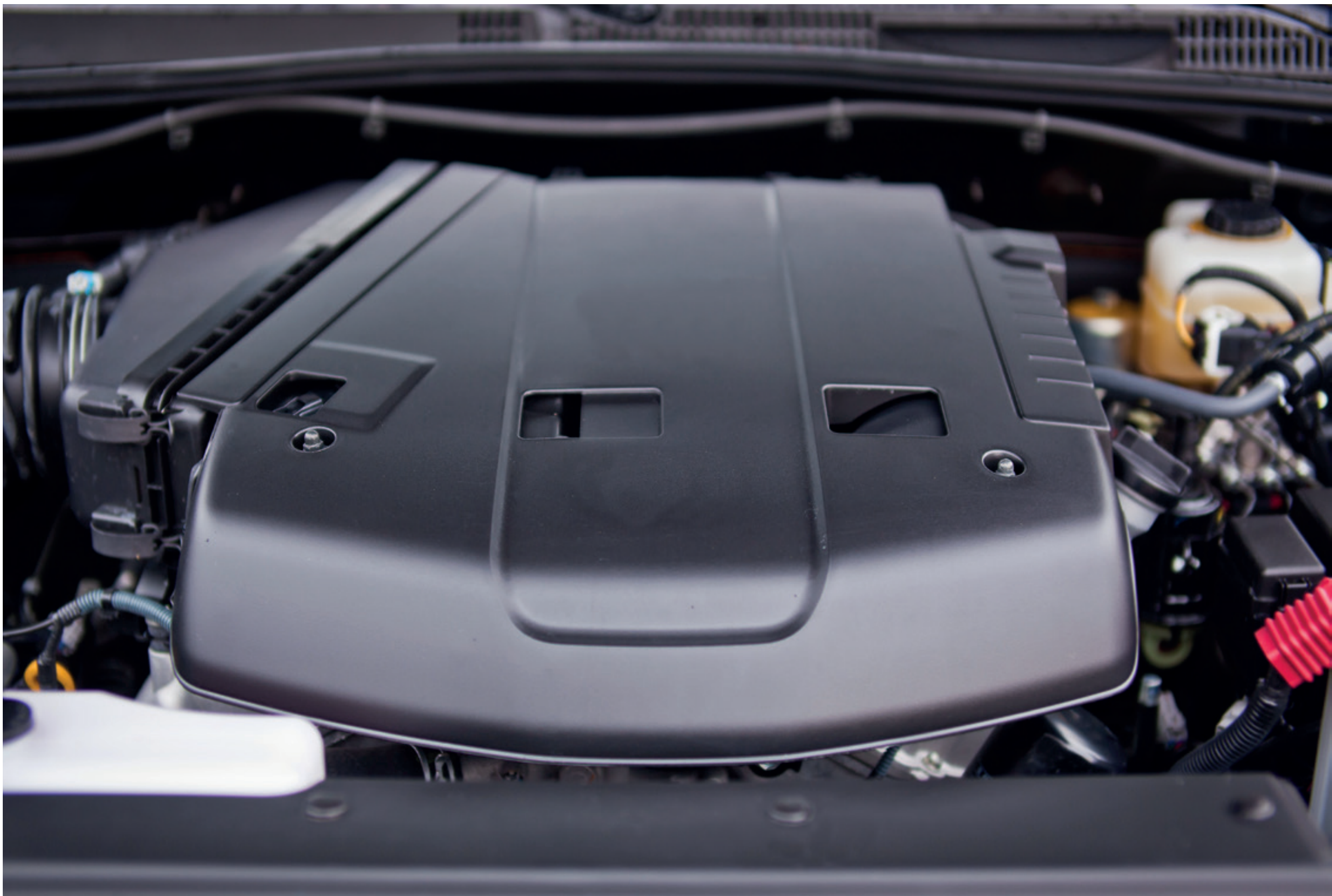
Omya offers innovative calcium carbonate grades engineered specifically for use in engineering polymers. These advanced mineral solutions deliver significantly improved mechanical properties compared to conventional calcium carbonate grades and offer distinct advantages over other mineral fillers.

The key benefits of these grades lie in their ability to enhance the sustainability profile of the final product while simultaneously improving mechanical performance. Omya's calcium carbonate solutions support the industry's drive toward more cost-efficient and circular products.

	Omya Smartfill	Omyaspace 806
PA	x	x
PC	x	
ABS		x
PC/ABS		x

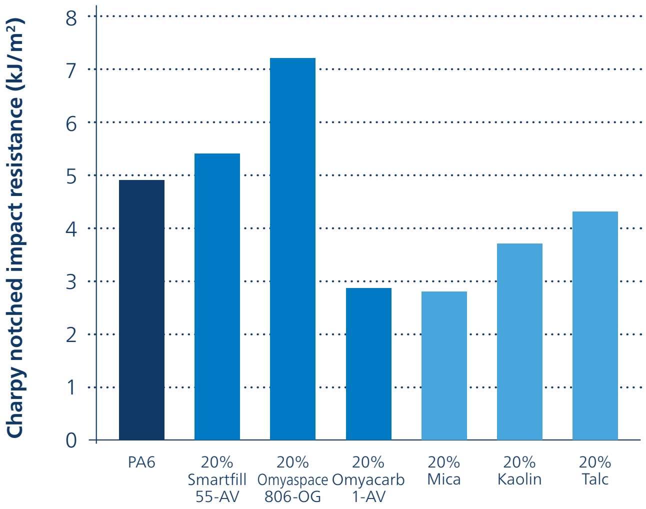
Table 1: Omya's product recommendation for engineering polymers

Improved ductility in polyamide (PA) with enhanced sustainability

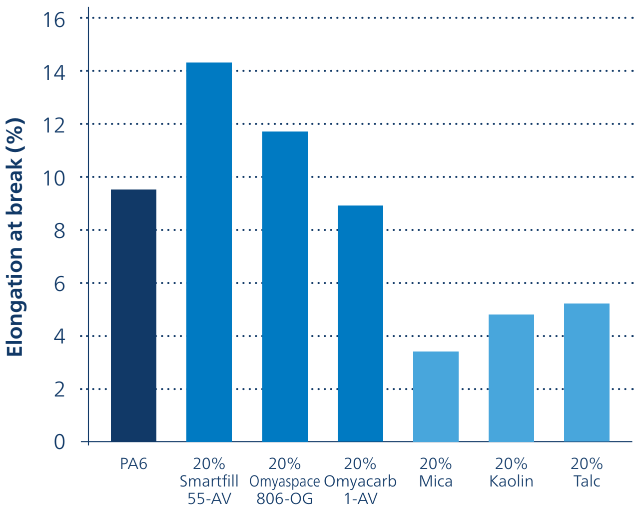


Omya Smartfill and Omyaspace 806 improve the impact resistance (Graph 1), the elongation (Graph 2) and stiffness (Graph 3) in polyamide. They offer processing benefits such as reduced warpage due to enhanced isotropy, along with improved surface finish in glass fiber-reinforced compounds. Omyaspace 806 delivers the highest impact resistance (Graph 1), while Omya Smartfill excels in elongation at break (Graph 2).

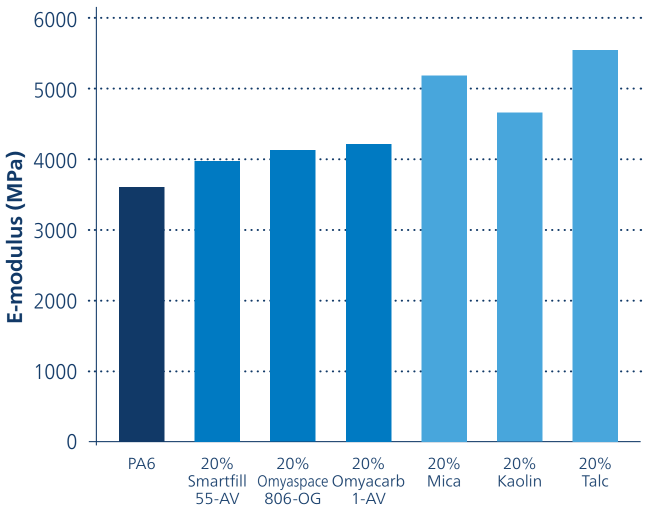
Compared to minerals like mica, talc, and kaolin, Omya's product solutions provide superior impact resistance and exceptional whiteness.



Graph 1: Charpy notched impact resistance



Graph 2: Elongation at break



Graph 3: E-modulus

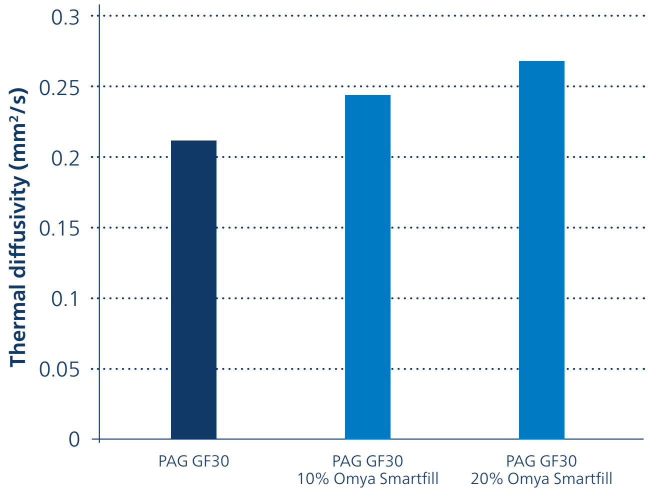
Key advantages in PA compounds

- ✓ Enhanced ductility
- ✓ Improved dimensional stability
- ✓ Increased stiffness
- ✓ Faster heating and cooling
- ✓ Lower carbon footprint
- ✓ Increased recycled content*
- ✓ Improved profitability

*on selected grades

Omya Smartfill and Omyaspace 806 enhance dimensional stability in glass fiber compounds, without compromising impact resistance (Table 2), and can also partially replace glass fibers.

Replacing 5% glass fiber with 10–20% Omya Smartfill in PA6 compounds results in improved overall performance including faster heating and cooling (Graph 4) because of an increase thermal diffusivity.



Graph 4: Heat transfer of Omya Smartfill in PA

		Omya Smartfill		
		0 %	10 %	20 %
E-modulus [N/mm²]	PA6GF30	8070	9010	10600
Charpy notched impact [kJ/m²]	PA6GF30	10.8	11.1	10.0
Yield strength [N/mm²]	PA6GF30	142	135	130
E-modulus [N/mm²]	PA6GF25		8060	10400
Charpy notched impact [kJ/m²]	PA6GF25		10.4	9.8
Yield strength [N/mm²]	PA6GF25		122	133
E-modulus [N/mm²]	PA6GF20		6740	7370
Charpy notched impact [kJ/m²]	PA6GF20		8.1	8.6
Yield strength [N/mm²]	PA6GF20		106	106

Table 2: PA6 glass fiber compound with Omya Smartfill

Improving ductility in primary and recycled polycarbonate (PC)

Thanks to the unique surface treatment of Omya Smartfill, Omya offers a mineral solution that not only enhances notched impact resistance and stiffness of PC (Table 3), but it also maintains brightness (L*) of opaque PC grades while requiring less pigments (Table 4), delivering both sustainability and cost advantages.

		Omya Smartfill				
		0 %	5 %	10 %	15 %	20 %
Charpy notched impact	[kJ/m²]	12	17	24	22	18
Elongation at break	[%]	76	75	74	71	53
Tensile modulus	[MPa]	2320	2470	2620	2780	2820
Tensile strength	[MPa]	65	61	58	54	53
MFI (300°C/1.2kg)	[g/10 min]	10	13	16	17	18

Table 3: Compounds made from black polycarbonate and Omya Smartfill 55-AV

	6% TiO_2	3% TiO_2 + 7% Omya Smartfill
L*	96	95
a*	-0.4	-0.1
b*	2.7	3

Table 4: Synergistic effects of Omya Smartfill with titanium dioxide

Moreover, Omya Smartfill significantly boosts the mechanical performance of recycled polycarbonate (Table 5), supporting broader use of recycled PC in a circular economy.

		Omya Smartfill	
		0 %	10 %
Charpy notched impact	[kJ/m²]	11	25
Elongation at break	[%]	58	73
Tensile modulus	[MPa]	2250	2520
Tensile strength	[MPa]	65	57
MFI (300°C/1.2kg)	[g/10 min]	11	14

Table 5: Recycled transparent PC with 10% Omya Smartfill

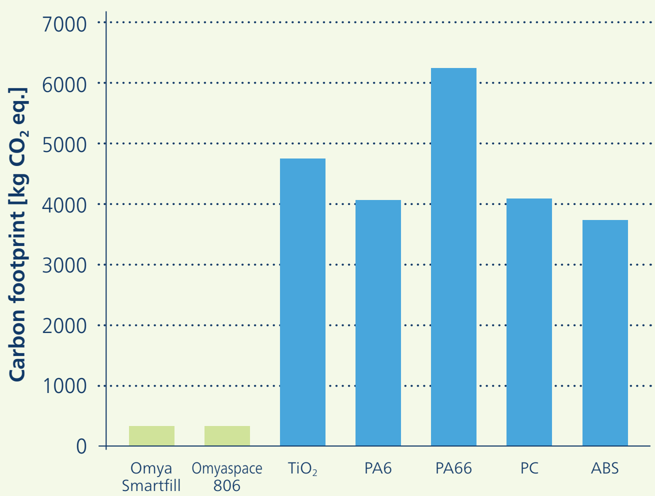
Key advantages in PC compounds

- ✓ Enhanced ductility
- ✓ Increased brightness in white polycarbonate
- ✓ Increased stiffness
- ✓ Faster heating and cooling
- ✓ Improved profitability
- ✓ Lower carbon footprint
- ✓ Increased recycled content*

*on selected grades

Carbon footprint

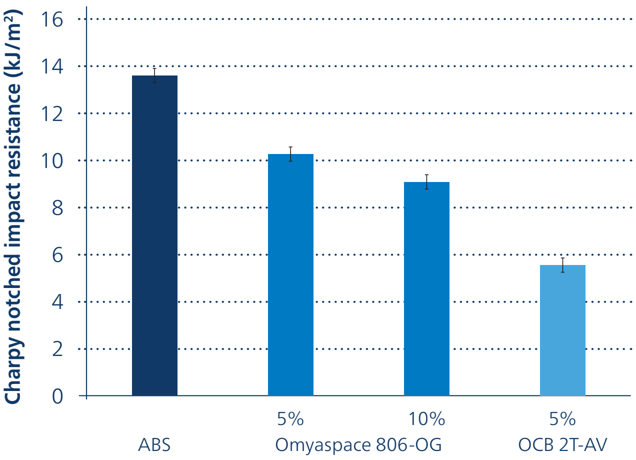
Omya Smartfill and Omyaspace 806 have a carbon footprint of <300 kg CO_2 equivalent per metric ton and improves the carbon footprint of compounds when displacing polymer or glass fiber.



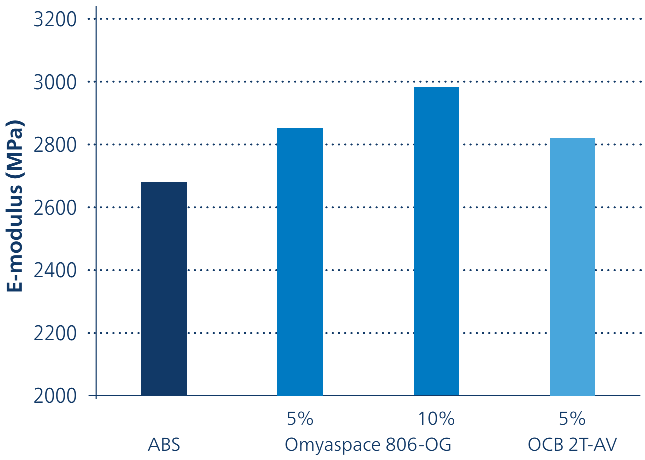
Improving ABS sustainability and profitability with minor loss on impact strength

Calcium carbonate is the solution to improve the sustainability of plastics and increase profitability. Standard calcium carbonate, such as Omyacarb 2T, which is used cost-effectively in many plastics, tends to reduce notched impact resistance in high-impact materials like ABS.

With the launch of Omyaspace 806, this drawback has been significantly minimized (Graph 5), enabling the use of calcium carbonate with its benefits like stiffness increase (Graph 6) and cost reduction in many ABS applications. In addition to improved mechanical properties, it also enhances the dispersion of titanium dioxide (Table 6), allowing for further cost optimization.



Graph 5: Charpy notched impact resistance of ABS compounds



Graph 6: E-modulus of ABS compounds

	Omyaspace 806-OG		
	0%	5%	10%
L*	75	79	82
a*	-0.3	0.0	0.2
b*	6	7	8

Table 6: Omyaspace 806 in white ABS

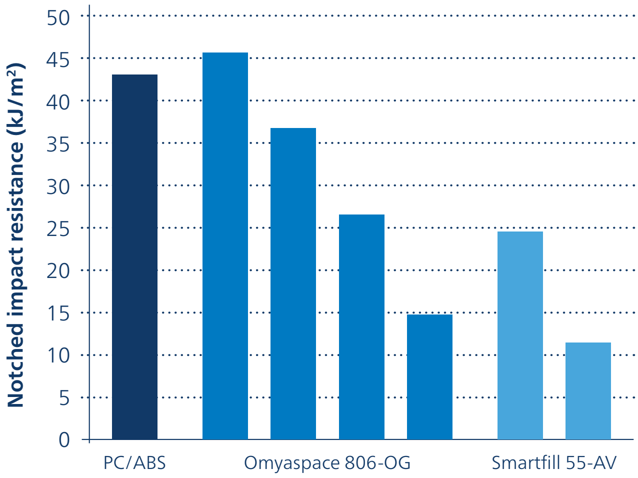
Key advantages in ABS

- ✓ Minor loss on impact strength
- ✓ Increased stiffness
- ✓ Enhanced brightness
- ✓ Accelerated heating and cooling
- ✓ Improved profitability
- ✓ Reduced carbon footprint

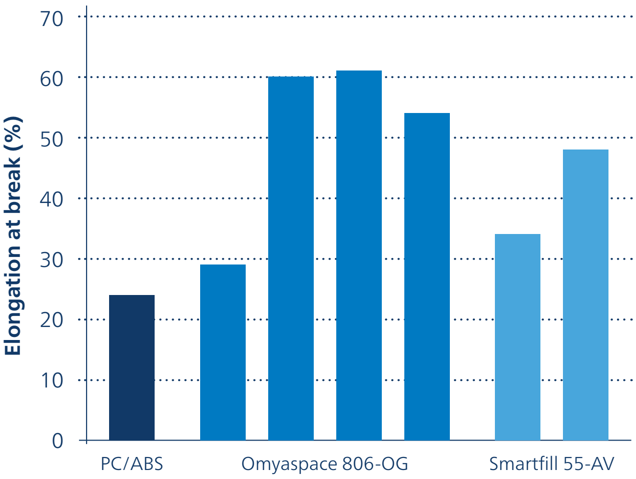
Enhancing profitability and sustainability in PC/ABS

For PC/ABS, as with ABS, Omyaspace 806 remains the preferred choice due to its superior notched impact resistance, which is notably higher compared to formulations using Omya Smartfill (Graph 7).

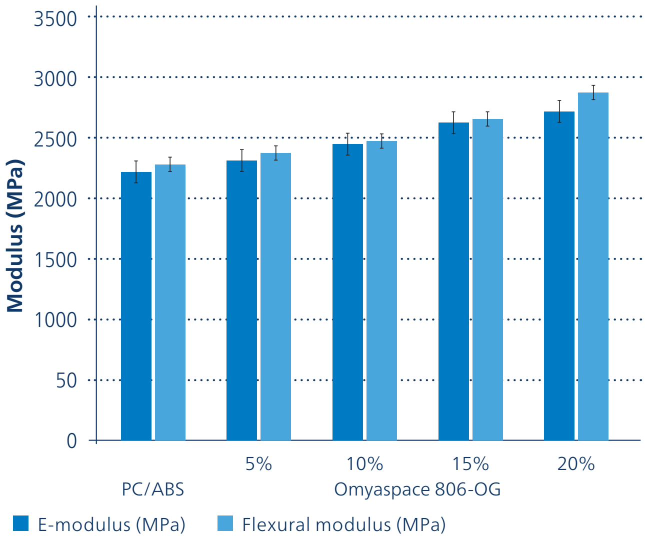
By adding 5% to 10% Omyaspace 806, the notched impact resistance (Graph 8) remains constant while elongation (Graph 8) and stiffness (Graph 9) are improved.



Graph 7: Notched impact resistance of PC/ABS compounds



Graph 8: Elongation at break



Graph 9: Modulus of PC/ABS compounds

Key advantages in PC/ABS

- ✓ Equal impact strength
- ✓ Increased stiffness
- ✓ Enhanced brightness
- ✓ Accelerated heating and cooling
- ✓ Improved profitability
- ✓ Reduced carbon footprint

Omya's commitment to sustainability

Some grades, such as Omya Smartfill 55-AV, are made from 100% pre-consumer recycled calcium carbonate, certified by Bureau Veritas.

The recycled status of this material does not affect suitability for use in contact-sensitive applications (like food contact/food packaging).

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Source: Omya International (2025/09) EN