

# Real solutions. Real metal to plastic choices.

Industry regulations and consumer demands change frequently – and as a result, so do your product needs. Let us help you understand how to reduce your product’s weight and cost all while maintaining performance and quality.

## Benefits of choosing plastic over metal:

- ▶ Cost reduction
- ▶ Weight reduction
- ▶ Design freedom
- ▶ Secondary operation elimination
- ▶ Parts consolidation
- ▶ Inherent corrosion resistance
- ▶ Longer tool life

## Typical metal die-cast competition:

- ▶ Aluminum
- ▶ Magnesium
- ▶ Zinc

Type of Material	Abbreviation(s)	Recommended Tool Temperature (°C)	Hot Water Moldable	Surface Appearance	Heat Deflection at 264 psi (°C)	Tensile Strength (MPa)	Flexural Modulus (MPa)	Wear and Friction	Chemical Resistance	Tradenames	Advantages
High Performance Polyamide	HPPA	80-140	Yes	Better	255	285	21,500	Better	Better	SYENSQO Omnix®	<ul style="list-style-type: none"> <li>• Excellent colorability</li> <li>• Higher heat resistance and lower moisture uptake than PA 6/6</li> </ul>
Polyarylamide	PARA, PA MXD6	120-160	—	Best	255	290	33,000	Better	Better	Mitsubishi Reny® SYENSQO Ixef®	<ul style="list-style-type: none"> <li>• Low moisture uptake for great dimensional stability</li> <li>• Great retention of mechanicals even at elevated temperatures</li> </ul>
Polyetheretherketone	PEEK	175-205	—	Better	332	258	30,000	Best	Best	SYENSQO KetaSpire®	<ul style="list-style-type: none"> <li>• Inherently V-0 flame rated</li> <li>• Excellent chemical resistance</li> </ul>
Polyetherimide	PEI	135-165	—	Better	212	179	11,700	Good	Better	SABIC’s Specialties business ULTEM™	<ul style="list-style-type: none"> <li>• Inherently V-0 flame rated</li> <li>• Good clarity</li> <li>• Plateable</li> <li>• Fire-Smoke-Toxicity (FST) compliant</li> </ul>
Polyphenylene Ether + Polystyrene	PPE+PS	180-250	Yes	Better	148	165	11,700	Good	Better	SABIC’s Specialties business NORLYL™	<ul style="list-style-type: none"> <li>• Low moisture uptake for great dimensional stability</li> <li>• Great property retention after outdoor UV exposure</li> <li>• Excellent resistance to chlorine treated water for potable water applications</li> </ul>
Polyphthalamide	PPA	65-180	Yes	Better	310	280	22,800	Better	Better	SYENSQO Amodel® ENVALIOR FORTII® & FORTII® ACE	<ul style="list-style-type: none"> <li>• Lower and slower moisture uptake than PA 6/6</li> <li>• Great retention of mechanicals even at elevated temperatures and high humidity</li> </ul>
Polyethersulfone	PESU	120-160	—	Better	216	126	8,070	Good	Better	SYENSQO Veradel®	<ul style="list-style-type: none"> <li>• Improved isotropic shrinkage and CLTE leading to better dimensional stability</li> <li>• High RTI</li> <li>• Good chemical resistance</li> <li>• Inherently V-0 flame rated</li> </ul>

\*HDT, Tensile, and Flex all based on grade with the highest value

## Long fiber compounds: LNP™ VERTON™ from SABIC's Specialties business

### Advantages

- Hot water moldable grades available
- High stiffness and heat deflection
- Availability in many different base resins



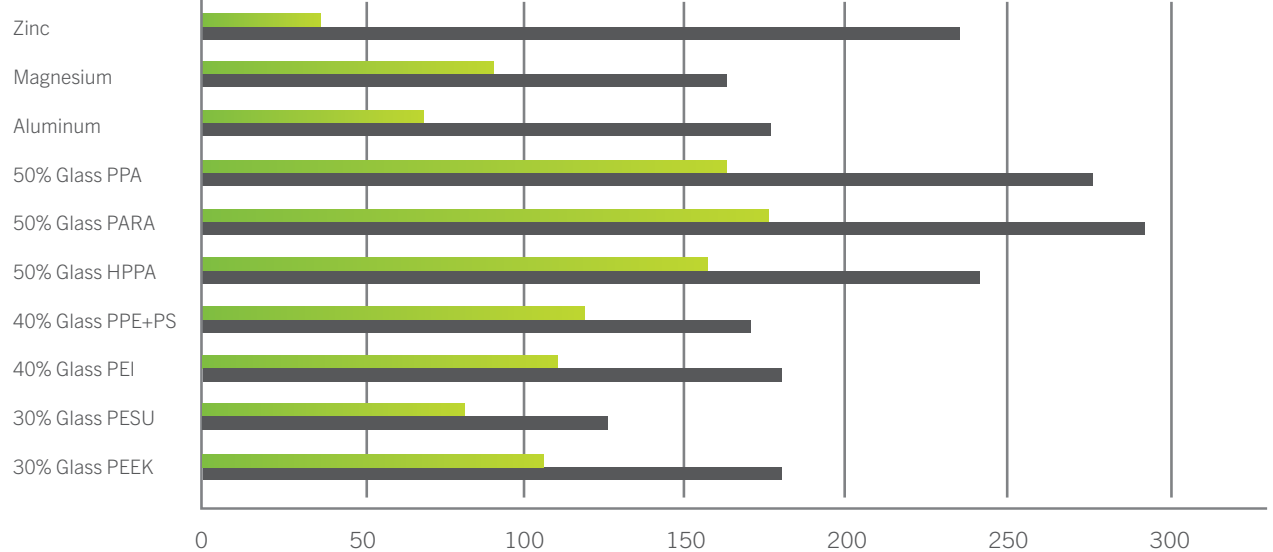
## Specific Gravity Comparison

Material	Specific Gravity (g/cm <sup>3</sup> )
Zinc	6.5
Magnesium	1.74
Aluminum	2.7
50% Glass PPA	1.67
50% Glass PARA	1.65
50% Glass HPPA	1.59
40% Glass PPE+PS	1.40
40% Glass PEI	1.61
30% Glass PESU	1.58
30% Glass PEEK	1.53

## Weight vs. Strength Comparison

Plastics show greater specific strength\* compared to metals, allowing applications to meet the strength requirements while reducing weight

### Material



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■ Specific Tensile Strength (MPa/Kg) ■ Tensile Strength (MPa)

\*Specific strength is a material's strength (force per unit area at failure) divided by its density. It is also known as the strength-to-weight ratio or strength/weight ratio.

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