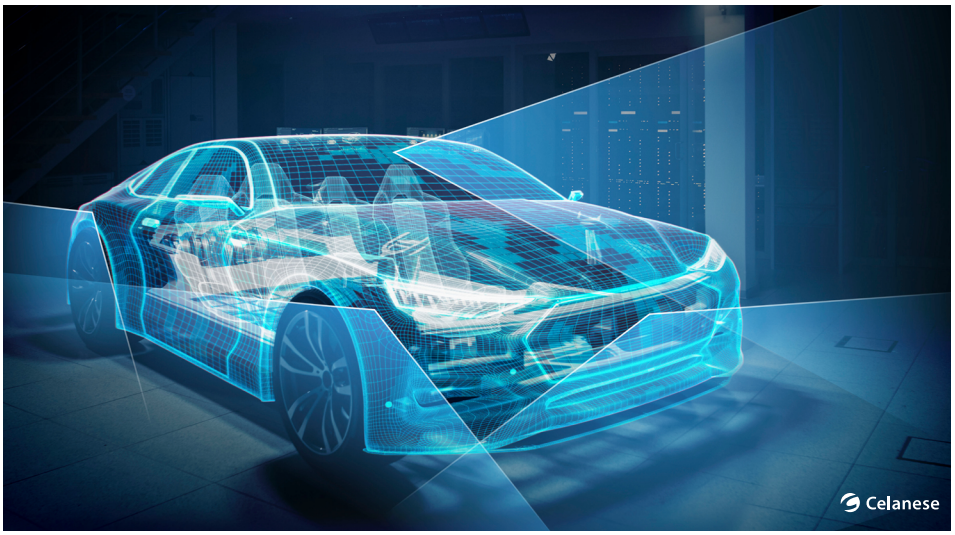
SOLUTION SHOWCASE

Celanese

DURABLE, PROVEN SOLUTIONS FOR AUTOMOTIVE RADAR SYSTEMS



Improvements in small, durable solutions are driving developments in the advanced driver assistance systems (ADAS) industry. Sensors must rapidly evolve to meet rising autonomy levels in vehicles, as well as demand for active safety and driver assistance technologies. Heightened consumer awareness of active safety technologies and driving comfort supports the growing demand for radars. Enormous growth in radars makes it possible to meet safety regulations that mandate the use of active safety and driver assistance technologies, such as collision warning systems, automatic emergency braking, and lane departure warnings.

INDUSTRY NEEDS

- Low dielectric properties for radar transparency
- Material and design solutions for radar absorbency
- Excellent dimensional stability and low warpage
- Excellent balance of mechanical properties
- Resistance to exterior environments, including road salt, automotive fluids, thermal cycling, and hydrolysis resistance
- Improved laser-marking properties

SOLUTIONS

Celanese Zytel® PA nylon resins and Celanese Crastin® PBT resins offer clear advantages for vehicle manufacturers. Our innovative materials help create solutions for advanced connectivity, sensing, and control. Working in parallel with our customers, our experienced team of engineers, scientists, and market experts deliver solutions that enhance the durability, lifespan, and performance of radar system components.

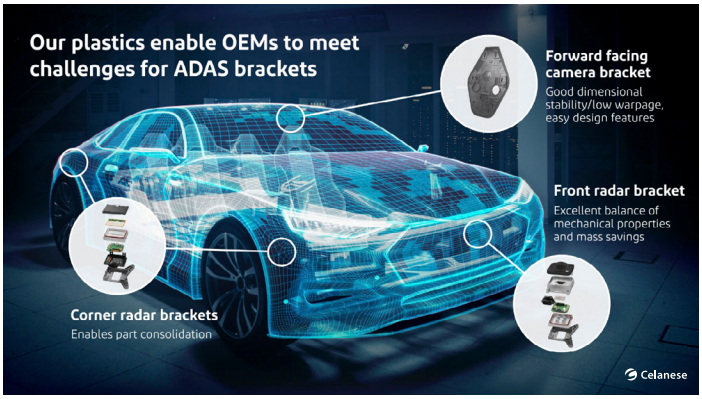
ABOUT ZYTEL® PA

Celanese Zytel® PA is a proven line of stiff, strong nylon resins. Zytel® products offer outstanding heat, chemical, and electrical resistance. Specific benefits for automotive radar system brackets include:

- Excellent combination of toughness, stiffness, and dimensional stability
- Good chemical resistance
- Extensive material data available for anisotropic analysis
- Enhanced laser marking solutions

ABOUT CRASTIN® PBT

Celanese Crastin® PBT is a stiff, tough PBT thermoplastic with superior electrical-insulating properties. Crastin® PBT is the resin of choice for cost-effective, high-performing automotive radar systems.



Crastin® PBT and Zytel® PA offer benefits to support multiple radar system components:

RADOME

- Improved radio transparency with low Dk and low Df
- Excellent dimensional stability
- Improved toughness
- Superior hydrolysis resistance for hot and humid environments
- Available laser transparent and with improved laser marking
- Low warpage for higher dimensional control
- Standard grade with good mechanical properties

BACK HOUSING AND CONNECTOR

- Higher thermal conductivity for heat dissipation
- EMI shielding (depending on requirements)
- Improved toughness
- Superior hydrolysis resistance for hot and humid environments
- Improved thermal-shock-cycling resistance
- Available laser transparent and improved laser marking
- Low warpage for higher dimensional control
- Standard grade with good mechanical properties

MOUNTING BRACKETS SENSOR SUPPORT

- Excellent combination of toughness and stiffness
- Good chemical resistance
- Extensive material data available for anisotropic analysis
- Improved laser marking solutions available

SOLUTIONS FOR RADOME

	Product Description	Dielectric Properties at 77GHz	Low-Warpage / Dimensional Stability	Laser Weldable (Transparent)	Hydrolysis Resistant
Crastin® PBT SK605	PBT-GF30	+	++	+++	++
Crastin® PBT LW9020	PBT/ASA-GF20	+++	++++	++++	+++
Crastin® PBT LW9030	PBT/ASA-GF30	++	+++	+++	+++
Crastin® PBT LW9320	PBT/SAN-GF20	+++	++++	++++	+++
Crastin® PBT LW9330	PBT/SAN-GF30	++	+++	+++	+++
Crastin® PBT HR5430HFS*	PBT-GF30 HR	+	+++	++++	++++
Crastin® PBT HR5330HFS	PBT-GF30 HR	+	++	++	++++
Crastin® PBT HR5315HFS	PBT-GF15 HR	+++	+++	++	++++
NPO 2020-070		++++	+++	++++	+++

*Not fully commercial

Source: Celanese

SOLUTIONS FOR RADAR HOUSING AND CONNECTOR

	Product Description	Low-Warpage Dimensional Stability	Hydrolysis Resistant	Laser Weldable (Absorber)	Laser Markable	Spiral Flow	EMI Shielding (77GHz)	Heat Dissipation
Crastin® PBT SK605LM	PBT-GF30	++	++	+++	++++	++++	++	++
Crastin® PBT LW9020	PBT/ASA-GF20	++++	+++	++++	+++	++++	+	++
Crastin® PBT LW9030	PBT/ASA-GF30	+++	+++	+++	+++	++++	++	++
Crastin® PBT LW9320LM	PBT/SAN-GF20	++++	+++	++++	++++	++++	+	++
Crastin® PBT LW9330	PBT/SAN-GF30	+++	+++	+++	+++	++++	++	++
Crastin® PBT HR5430HFS	PBT-GF30 HR	++	++++	++++	+++	++++	++	++
Crastin® PBT HR5330HFS	PBT-GF30 HR	++	++++	++	+++	++++	++	++
Crastin® PBT HR5315HFS	PBT-GF15 HR	+++	++++	++	+++	++++	+	++
NPO 2020-070		+++	+++	++++	+++	++++	++++	++

Source: Celanese

SOLUTIONS FOR MOUNTING BRACKETS SENSOR SUPPORT

	Product Description	Stiffness Strength	Vibration Fatigue & Creep	Dimensional Stability	Heat Resistance	Hydrolysis Resistance	Road Salt Resistance	Laser Markable	Snap Fit	EMI Shielding (77GHz)
Crastin® PBT LW9030	PBT/ASA-GF30	+++	+++	+++	+++	++	++	++++	+	++
Zytel® 70G30HSLR	PA66-GF30	+++	+++	++	++++	++++	++++	++	++	++
Zytel® 70G33HS1L	PA66-GF33	+++	+++	++	++++	++++	++++	++	++	++
Zytel® 70G35HSLRA4	PA66-GF35	+++	+++	++	++++	++++	++++	++	++	++
Zytel® 73G30HSL	PA6-GF30	+++	+++	++	+++	+++	+++	++	++	++
Zytel® 73G35HSL	PA6-GF35	+++	+++	++	+++	+++	+++	++	++	++
Zytel® 73G40HSLA	PA6-GF40	+++	+++	+	+++	+++	+++	++	++	++

Source: Celanese

Best

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