LUMAS
AM POLYMERS

PK 5000 POWDER

Lumas Polymer's next generation SLS powder surpasses the limitations of existing SLS powders. This latest evolution expands the applications of additive manufacturing across your enterprise and product lines.

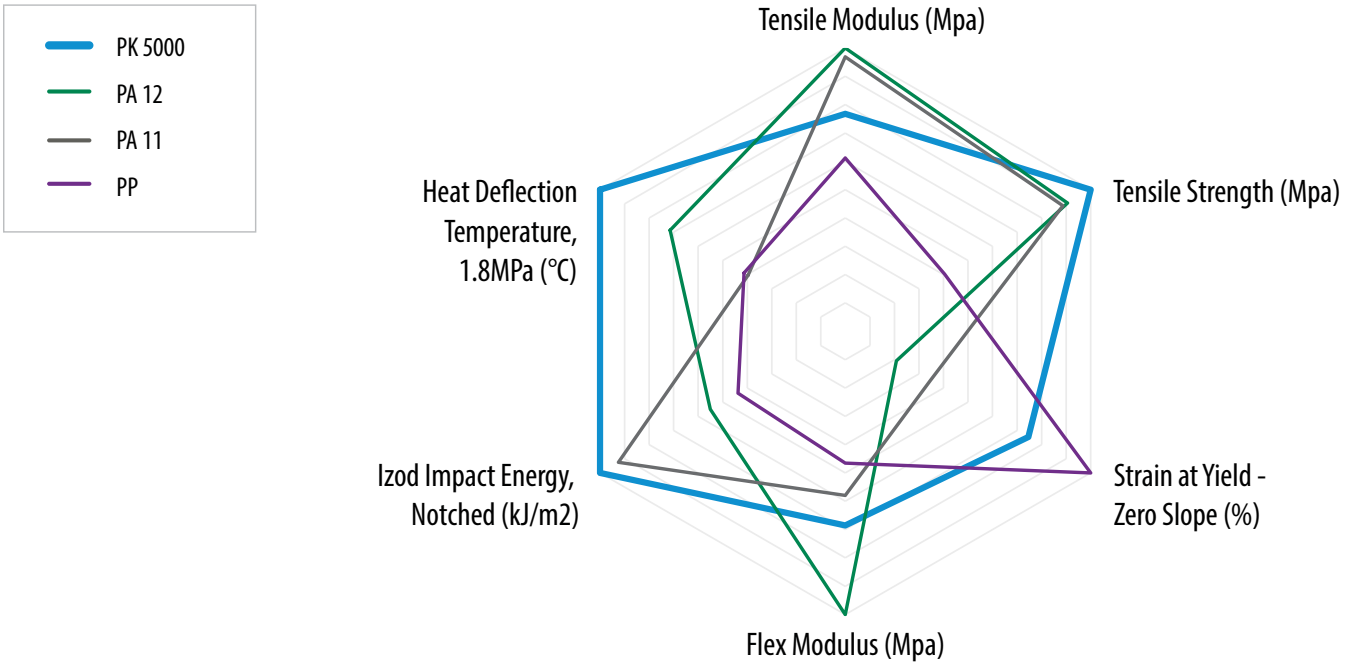
PK 5000 Powder features a unique combination of chemical and mechanical properties, such as high-impact strength, high-abrasion resistance and improved elongation to withstand functional testing and use. Equally important, PK 5000 has high-barrier properties and low-moisture absorption, which are critical for ensuring the quality and resilience of parts and products exposed to fuel, water, harsh chemicals and rugged environments.

Our engineered powder, which is based on PolyKetone, is an eco-friendly and non-toxic polymer made from carbon monoxide sequestered from manufacturing emissions assisting you in corporate sustainability initiatives. The ability to leverage carbon monoxide, which is a leading cause of atmospheric pollution, reduces its overall carbon footprint.

KEY HIGHLIGHTS

- Durability and strength
- Low-cost material
- Non-marring and abrasion resistant
- Excellent chemical resistance
- Very low moisture absorption
- Very good elongation properties at extreme temperatures
- Eliminates random outliers in mechanical properties that are found in SLS printing
- Similar processing parameters to PA 11 SLS
- 60% less carbon footprint impact than PA 12
- Low warp materials

COMPARISON TO SIMILAR MATERIALS



MATERIAL	UTS (MPA)	MODULUS (MPA)	EAB (%) S	UNNOTCHED IMPACT STRENGTH (J/M)	NOTCHED IMPACT STRENGTH (J/M)	SINTERED DENSITY (G/CC)	ELONGATION AT YIELD, OFFSET 0.2%	TENSILE STRESS AT YIELD, OFFSET 0.2%
	Orientation	Orientation	Orientation	Orientation	Orientation	Orientation	(%)	(MPa)
	XY	XY	Z	XY	XY	-	XY	-
	Mean	Mean	Mean	Mean	Mean	Mean	Mean	-
PA 11	48	1517	47	1486	74	1	1.73	26.4
PA 12	43	1568	14	336	32	1	1.64	21.4
PK 5000	53	1305	41	1241	83	1.23	1.9	17.6
PP	21.4	1640	34	-	31	-	-	-

CHEMICAL RESISTANCE

In addition to good mechanical properties, PK5000 powder for SLS printing has great resistance to a variety of chemicals for demanding applications. Printed PK5000 has a low polarity surface, which coupled with its high crystallinity and close packing in the crystalline phase prove to handle many harsh chemicals.

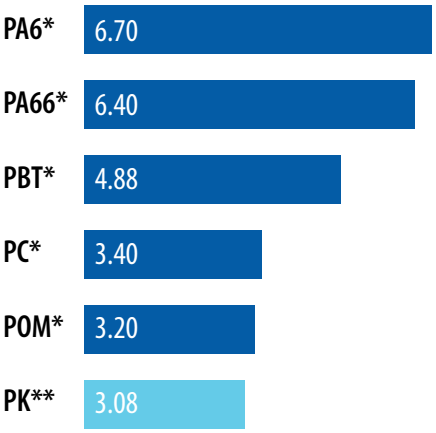
	PK 5000	PA 12
Hydrocarbons — Fuels		
Aliphatic — Butane, Propane, Octane, Methane	○	○
Aromatic — Benzene, Methylbenzene, Napthalene	○	○
Halogenated — Methylene chloride, chloroform, carbon tetrachloride	○	
Ketones — Acetone, Paint Thinner	○	○
Esters/Ethers — Glues, Flavorings, Perfumes, Cosmetics	○	○
Aldehydes — Methanal, Ethanal, Propanal, Butanal	○	●
Aqueous		
Water	○	○
Weak Acids — Sulfuric Acid, Acetic Acid, Hydroflouric Acid	○	●
Weak Bases — Ammonia, Copper Hyrdoxide	○	●
Strong Acids — Nitric Acid, Chloric Acid, Hydrochloric Acid	●	●
Strong Bases — Potassium hydroxide, sodium hydroxide, Lithium Hydroxide	●	●

○ ○ Resistant ● ● Not Resistant

For additional information, visit lumaspolymers.com

EMISSIONS DURING THE PRODUCTION PROCESS

GLOBAL WARMING POTENTIAL (kg CO_2 eq)



NON-TOXIC HIGH EFFICIENCY

Acrylate Free

Melamine Free

Bisphenol A Free

Formaldehyde Free

Lead/Chrome Free

Phthalate Free

EARTH FRIENDLY

* Other ETP data is based upon the Eco Profiles data from www.plasticseurope.org

** PK data is based upon Ecoinvent database according to ISO Standard 4040 and 14044

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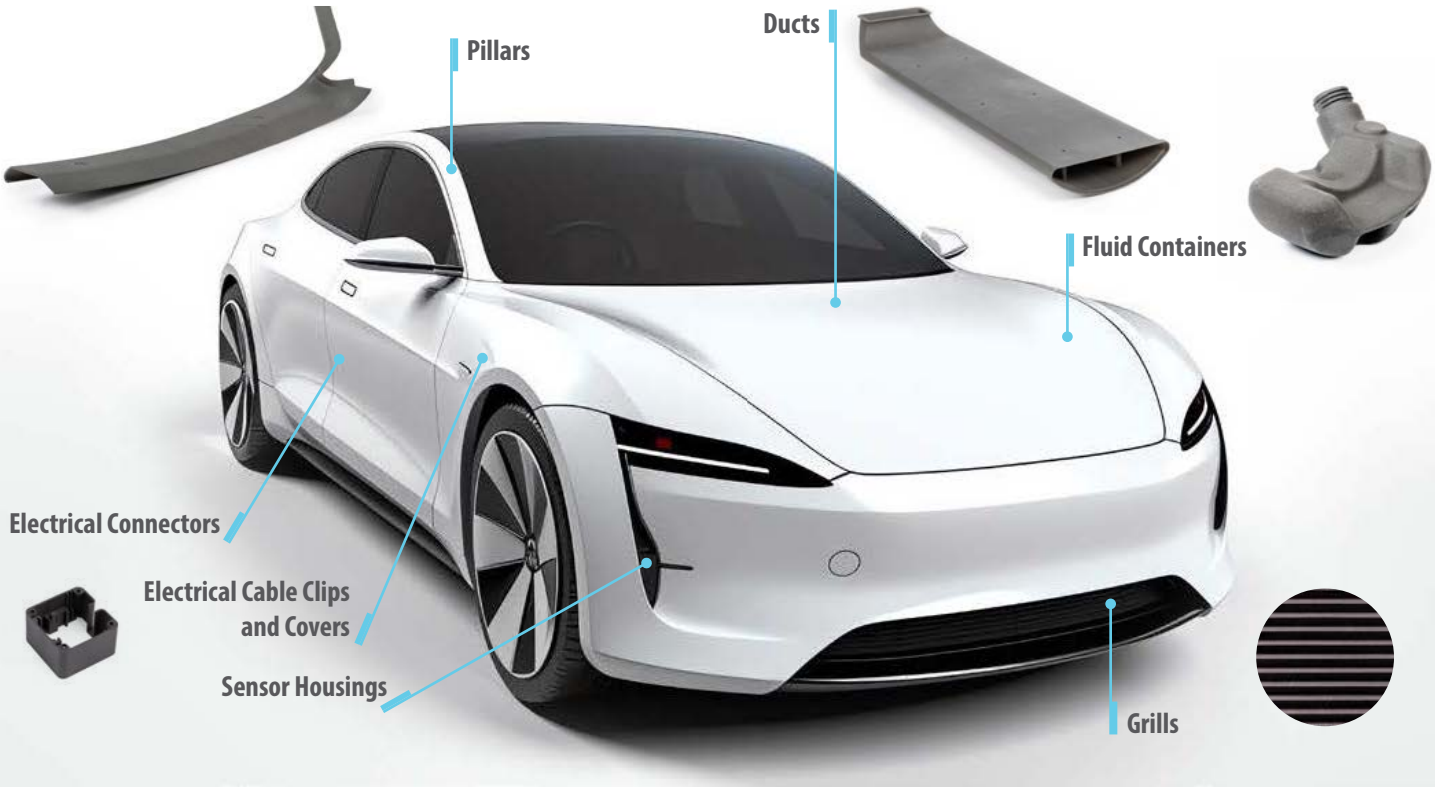
AUTOMOTIVE

PK 5000 shines in the automotive industry by printing durable and complex geometries without additional costs, making it ideal for manufacturing lightweight, integrated components that can contribute to vehicle efficiency.



PRINTING VOLUMES

Prototypes

Molding Equivalent Prototypes

Bridge Production

Serial Production Parts

ADDITIONAL APPLICATIONS

Underhood

Paneling

Surface Appearance/Aesthetic Parts

Paintable Parts

KEY APPLICATION FEATURES/BENEFITS

- Cost competitive for bridge and serial production
- Molding Equivalent Prototypes for low volume, bridge production
- Higher print success rate for larger components
- Durability
- Easy post-processing to get a better cosmetic for customer facing parts

For additional information, visit lumaspolymers.com

DRONE/UAV

PK 5000's mechanical properties prevent degradation from harsh chemicals and extreme temperatures and are able to handle maximum damage tolerances.

PRINTING VOLUMES

Prototypes

Molding Equivalent Prototypes

Serial Production In-flight Parts

Low to Medium Volume Production

ADDITIONAL APPLICATIONS

Fuel Tanks

Landing Gear

Damage Tolerance Skins

Pressure Vessels

Fluid Vessels

Panels

KEY APPLICATION FEATURES/BENEFITS

- 3D printed fuel tanks allow for design that increases fuel capacity and flight time
- PK 5000 is (chemical) resistant to (fuel mixture) and provides UV stability
- Rigidity and impact resistance for end use and ease of assembly
- Less overall weight from additive manufacturing improves performance
- "Higher" damage tolerance in multiple applications vs materials that meet heat and chemical requirements

For additional information, visit lumaspolymers.com

SPORTING GOODS

PK 5000 changes the sporting industry standard by shifting the focus on prototyping from look and feel, to functionality for immediate commercial use, testing and end-user personalization.

PRINTING VOLUMES

Molding Equivalent Prototypes

Suitable for End-use Testing

Serial Production Parts

ADDITIONAL APPLICATIONS

High-impact Sporting Goods

Cold Temperature Sporting Goods

High Damage Tolerance Sporting Goods

Safety Components in Gloves

Protective Equipment

Cleat Pieces

Helmet Components

KEY APPLICATION FEATURES/BENEFITS

- Toughness and resilience of material allow for molding equivalent prototyping
- Customer specific sizing and fitting (scan-to-print)
- Ability to test design iterations in real competitive atmospheres (live games)

For additional information, visit lumaspolymers.com

MEDICAL TRAINING DEVICES AND ORTHOTICS

Among many features, PK 5000's toughness and durability allow for life-size training models to maintain structure in transit and are conducive to training practices with real medical tools.

PRINTING VOLUMES

Prototypes

Molding Equivalent

Prototypes

Bridge Production

Serial Production Parts

ADDITIONAL APPLICATIONS

Living Hinge Orthotics

Actual Printed Foot

Sockets

Exoskeletons

Medical Training Devices

Rigid and Semi-Rigid Orthotics

KEY APPLICATION FEATURES/BENEFITS

- Low cost and design freedom to mimic human anatomy
- Resilience – ability to get back to its original shape
- Polyketone is a non-toxic, bio-compatible material
- Success in printing large components

For additional information, visit lumaspolymers.com

AGRICULTURE AND HEAVY MACHINERY

PK5000 works in conjunction with additive manufacturing in the agriculture space to allow printed parts that maintain strength and durability needs.

PRINTING VOLUMES

Low to Medium Volume Production

Prototypes

Molding Equivalent Prototypes

Bridge Production

Serial Production Parts

ADDITIONAL APPLICATIONS

Chemical and High Wear Parts

Grain Handling Hoppers

Fluid Handling Components

Air seeder

MRO Parts

Sensor Mounts

Brackets

Surface Panels

KEY APPLICATION FEATURES/BENEFITS

- Cost
- Higher print success rate for larger components
- Durability
- Molding equivalent prototyping for low volume, bridge production
- Chemical resistance
- Eliminates brittle print failures
- Part replacement for those impossible to solve situations and applications

For additional information, visit lumaspolymers.com

MILITARY VEHICLES

PK 5000 excels in prototype and end-use parts where printed parts need to act like molded parts and where annual volumes make tooling cost prohibitive. Large part sizes enable panels and pieces not possible with other technologies.

PRINTING VOLUMES

Prototypes

Molding Equivalent Prototypes

Bridge Production

Serial Production Parts

ADDITIONAL APPLICATIONS

Axle Parts

Pillars

Ducts

Fluid Containers

Grills

Sensor Housings

Electrical Connectors

Electrical Cable Clips and Covers

Underhood applications

Paneling

Surface Appearance/Aesthetic Parts

Paintable Parts

KEY APPLICATION FEATURES/BENEFITS

- Chemical Resistance and UV Stability
- Success in printing large components for large vehicles
- Durability for interior components
- Higher damage tolerance in multiple applications

For additional information, visit lumaspolymers.com

WEARABLES

PK 5000 excels in wearable devices where toughness is critical. PK combines a skin safe material with a nearly indestructible thermoplastic.

PRINTING VOLUMES

Prototypes

Molding Equivalent Prototypes

Bridge Production

Serial Production Parts

ADDITIONAL APPLICATIONS

Biometric/health monitoring products

Custody safety monitors

Fitness Tracking

Wrist/Ankle-Wear

Virtual Reality Headwear

Smart Watches

KEY APPLICATION FEATURES/BENEFITS

- Overall toughness
- Durability
- Polyketone is a non-toxic, bio-compatible material
- Cost competitive for low volume, bridge production
- Easy post processing for cosmetic customer facing parts

For additional information, visit lumaspolymers.com

FLUID HANDLING PRODUCTS

PK 5000's chemical resistance opens up opportunities for fluid handling pieces that need to function in harsh liquid products.

PRINTING VOLUMES

Prototypes

Molding Equivalent Prototypes

Bridge Production

Serial Production Parts

ADDITIONAL APPLICATIONS

Car Wash Components

Car Wash Replacement Parts

Industrial Vapor Smoother

Fluid Transfer Devices

Chemical Transfer Devices

Mixing/Metering

KEY APPLICATION FEATURES/BENEFITS

- Chemical Resistance
- Functional stability in harsh environments
- Extremely high burst pressures
- Cost competitive for serial production
- Cost competitive to more traditional chemical resistant materials
- Machinable for when O-ring grooves needed for elevated pressures

For additional information, visit lumaspolymers.com

Custom Sample Request

See how your 3D part looks, feels and performs when printed with our PK 5000.

To set up a meeting with us, contact us at:
customer_service@lumaspolymers.com