

# PK 5000 Powder

Jabil'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.



**JABIL** | ENGINEERED MATERIALS

**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.

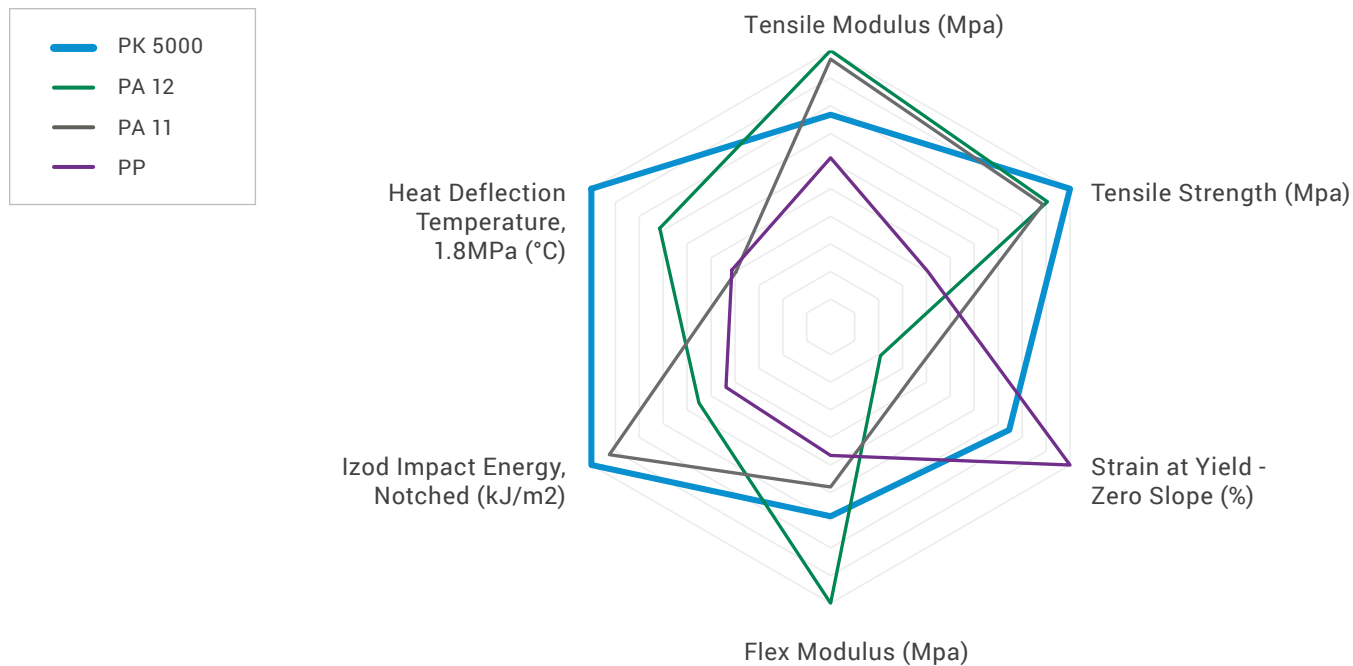
## KEY HIGHLIGHTS

- 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



For additional information, visit [jabil.com/engineered-materials](https://jabil.com/engineered-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% (MPa)
	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	-		-

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## CHEMICAL RESISTANCE

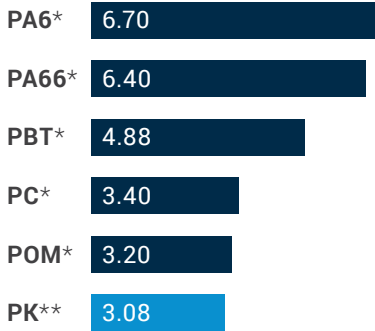
In addition to good mechanical properties, PK5000 powder for SLS printing has great resistance to a variety of chemicals for demanding applications. Printed PK5000 has a low polarity surface, which coupled with its high crystallinity and close packing in the crystalline phase prove to handle many harsh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

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

○● Resistant    ●● Not Resistant

## EMISSIONS DURING THE PRODUCTION PROCESS

### GLOBAL WARMING POTENTIAL (kg CO<sub>2</sub> eq)



\* Other ETP data is based upon the Eco Profiles data from [www.plasticseurope.org](http://www.plasticseurope.org)

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

### NON-TOXIC HIGH EFFICIENCY

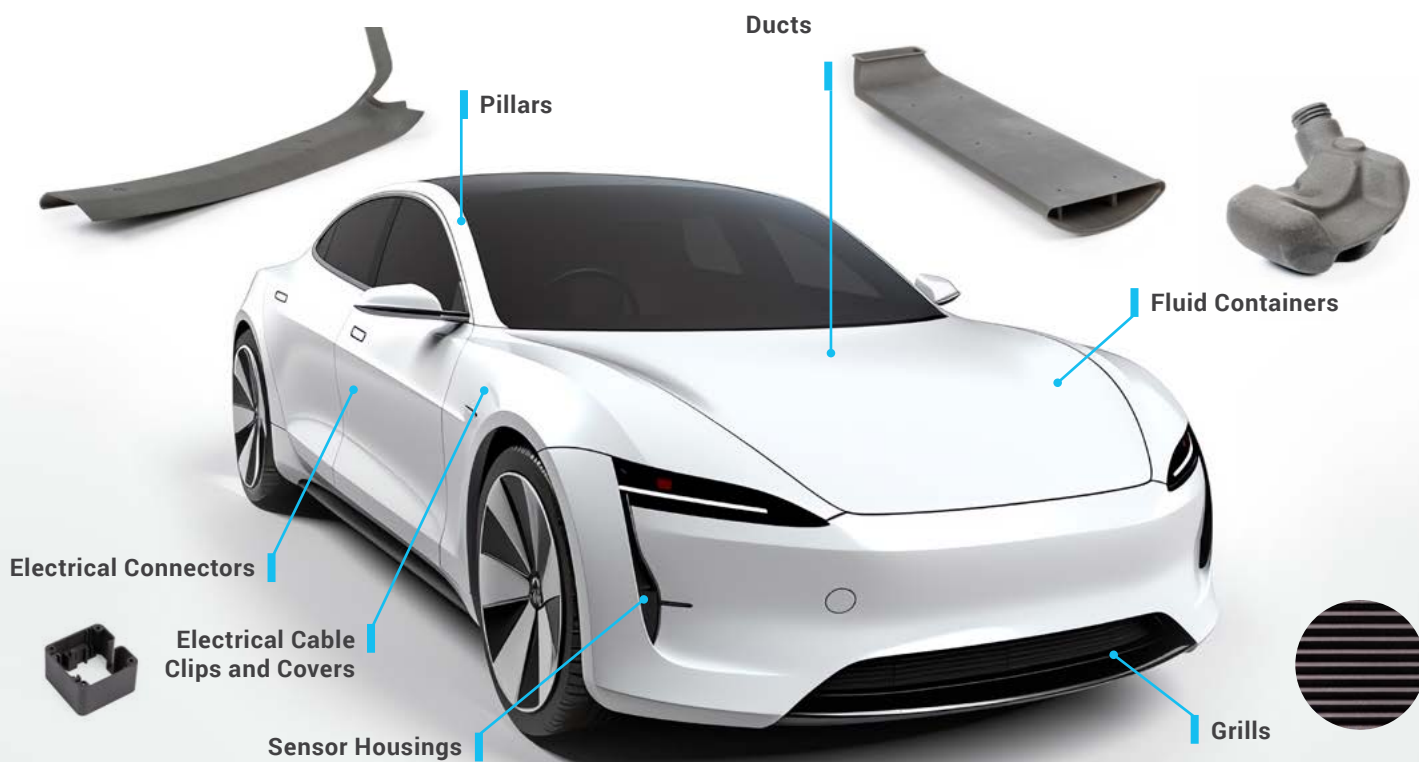
Acrylate Free  
 Melamine Free  
 Bisphenol A Free  
 Formaldehyde Free  
 Lead/Chrome Free  
 Phthalate Free



**EARTH  
FRIENDLY**

# 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 [jabil.com/engineered-materials](https://jabil.com/engineered-materials)

## 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

### 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

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# 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



## 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)

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# 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

## 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



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# 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

## 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 [jabil.com/engineered-materials](https://jabil.com/engineered-materials)

# 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

## 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 [jabil.com/engineered-materials](https://jabil.com/engineered-materials)

# 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

## 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 [jabil.com/engineered-materials](https://jabil.com/engineered-materials)

# 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

## 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 [jabil.com/engineered-materials](https://jabil.com/engineered-materials)



## 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, visit  
[https://calendly.com/melinda\\_grooms/discovery-call](https://calendly.com/melinda_grooms/discovery-call)