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PIOCREAT

G5 Print Settings Case studies

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耗材介绍一

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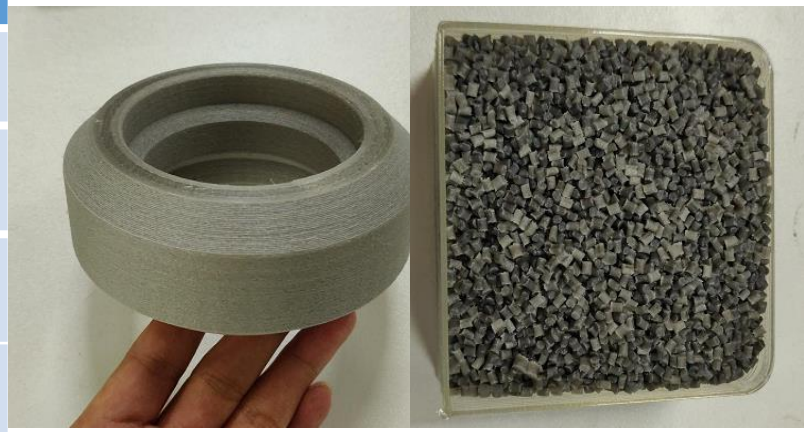
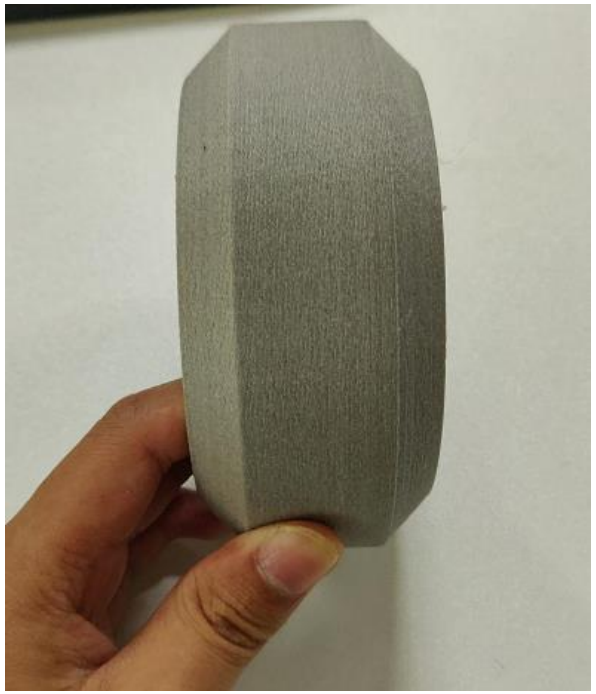
PA6

Nylon 6, also known as PA6, polyamide 6, nylon 6, is a polymer compound. The chemical and physical properties of nylon 6 are very similar to nylon 66, however, it has a lower melting point and a wide processing temperature range. It has better impact and dissolution resistance than nylon 66 plastic, but is also more hygroscopic. Because many quality characteristics of plastic parts are affected by hygroscopicity, it is important to take this into account when designing products using nylon 6. In order to improve the mechanical properties of nylon 6, various modifiers are often added. Glass fiber is the most common additive, and sometimes synthetic rubber, such as EPDM and SBR, is added to improve impact resistance. For products without additives, the shrinkage of nylon 6 plastic material is between 1% and 1.5%. Adding glass fiber additives can reduce the shrinkage to 0.3% (but slightly higher in the direction perpendicular to the process). The shrinkage of molding assembly is mainly affected by the crystallinity and hygroscopicity of the material. Actual shrinkage is also a function of part design, wall thickness and other process parameters. Nylon 6 injection drying treatment Since nylon 6 easily absorbs moisture, special attention should be paid to the drying before processing. If the material is supplied in waterproof packaging, the container should be kept tightly closed. If the humidity is greater than 0.2%, it is recommended to dry in hot air above 80°C for 16 hours. If the material has been exposed to air for more than 8 hours, vacuum drying at 105°C for more than 8 hours is recommended.

Case Study 1

G5-V Wheel - Printing Parameters				
Printing material(G5-PA6-20)	main ingredient	PA6	Test Date	2021.9.26
	Enhancer System	20% glass fiber	Particle diameter	2.5-3.0mm
Print temperature	Nozzle temperature	260℃	printing speed	30mm/s
	hot bed temperature	65℃	print layer height	0.4mm
Model size	120*120*51mm		Nozzle diameter	1mm
Bottom plate material	Semi-tempered carbon crystalline silicon glass		Infill	15%
Whether to use glue	Yes		Finished product	As shown on the right
Print environment	open			
Actual print time	4h30min			
Finished product summary	The surface layer is neat, frosted texture, high strength and certain toughness			



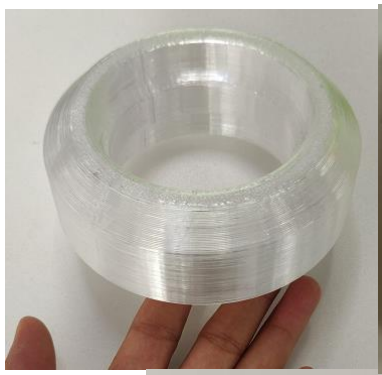


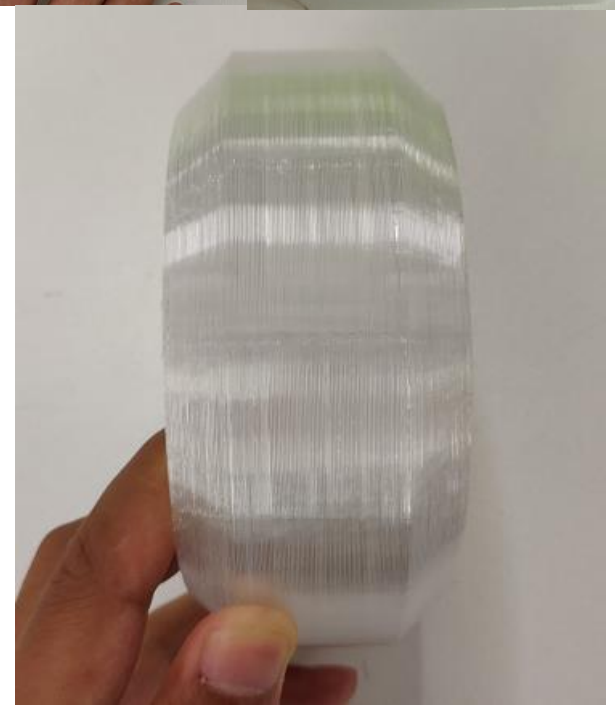
PS

Polystyrene (abbreviated PS) refers to a polymer synthesized by free radical addition polymerization of styrene monomer, and the chemical formula is (C8H8)n. It is a colorless and transparent thermoplastic with a glass transition temperature higher than 100°C, so it is often used to make various disposable containers that need to withstand the temperature of boiling water, as well as disposable foam lunch boxes. The glass transition temperature of polystyrene is 80 ~ 105℃, the amorphous density is 1.04 ~ 1.06g/cm3, the crystal density is 1.11 ~ 1.12g/cm3, the melting temperature is 240℃, and the resistivity is 1020 ~ 1022Ω·cm. Thermal conductivity 0.116 watts/(m·K) at 30°C. Usually polystyrene is an amorphous random polymer, which has excellent heat insulation, insulation and transparency. The long-term use temperature is 0-70 ° C, but it is brittle and easy to crack at low temperature. There are also isotactic and syndiotactic and atactic polystyrene. Isotactic polymers are highly crystalline, and syndiotactic polymers are partially crystalline.

打印案例一

G5-V轮-打印参数				
打印材料 (G5-GPPS)	main ingredient	GPPS	Test Date	2021.10.8
	Enhancer System	none	Particle diameter	3.0-4.0mm
Print temperature	Nozzle temperature	240℃	printing speed	38mm/s
	hot bed temperature	100℃	print layer height	0.4mm
Model size	120*120*51mm		Nozzle diameter	1mm
Bottom plate material	aluminum plate		Infill	15%
Whether to use glue	Yes		Finished product	如右图所示
Print environment	cooler box			
Actual print time	3h			
Finished product summary	The surface layer is neat, the hardness is high but very brittle, it needs to be printed in a thermal environment, otherwise the layers will break			





耗材介绍三

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PP

Polypropylene, abbreviated as PP, is a colorless, odorless, non-toxic, translucent solid substance. Polypropylene is a thermoplastic synthetic resin with excellent properties, which is a colorless and translucent thermoplastic lightweight general-purpose plastic. It has chemical resistance, heat resistance, electrical insulation, high-strength mechanical properties and good high wear-resistant processing properties, etc., which makes polypropylene rapidly used in machinery, automobiles, electronic appliances, construction, textiles, packaging since its inception. It has been widely developed and applied in many fields such as agriculture, forestry, fishery and food industry. In recent years, with the rapid development of my country's packaging, electronics, automobile and other industries, it has greatly promoted the development of my country's industry. And because of its plasticity, polypropylene materials are gradually replacing wooden products, and high strength, toughness and high wear resistance have gradually replaced the mechanical functions of metals. In addition, polypropylene has good grafting and compounding functions, and has huge application space in concrete, textile, packaging and agriculture, forestry and fishery.

打印案例一

G5-V轮-打印参数				
打印材料 (G5-PP-30)	main ingredient	PP	Test Date	2021.9.27
	Enhancer System	30% glassfiber	Particle diameter	2.0-3.0mm
Print temperature	Nozzle temperature	230℃	printing speed	30mm/s
	hot bed temperature	80℃	print layer height	0.4mm
Model size	120*120*51mm		Nozzle diameter	1mm
Bottom plate material	Semi-tempered carbon crystalline silicon glass		Infill	15%
Whether to use glue	Yes		Finished product	如右图所示
Print environment	open			
Actual print time	4h30min			
Finished product summary	The surface layer is neat, but the hand feel is rough and the strength is high. It is recommended to print in an incubator when printing larger models.			

耗材介绍四

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TPE

Thermoplastic elastomer, referred to as TPE or TPR, is the abbreviation of Thermoplastic rubber. It is a kind of elastomer that has the elasticity of rubber at room temperature and can be plasticized at high temperature. The structural feature of thermoplastic elastomers is that different resin segments and rubber segments are composed of chemical bonds. The resin segment forms physical cross-linking points by virtue of interchain force, and the rubber segment is a highly elastic segment that contributes to elasticity. The physical crosslinking of the plastic segments is reversible with temperature, showing the plastic processing properties of thermoplastic elastomers. Therefore, thermoplastic elastomer has the physical and mechanical properties of vulcanized rubber and the processing properties of thermoplastics. It is a new type of polymer material between rubber and resin, and is often referred to as the third-generation rubber. Thermoplastic elastomer is a new type of polymer material between rubber and resin, which can not only replace part of rubber, but also modify plastic. Thermoplastic elastomers have the dual properties and broad characteristics of rubber and plastic, so that they are widely used in the rubber industry to manufacture rubber shoes, tapes and other daily necessities and rubber hoses, tapes, rubber strips, rubber sheets, plastic parts and adhesives, etc. Various industrial supplies. At the same time, thermoplastic elastomers can also be widely used in the modification of general thermoplastic resins such as PVC, PE, PP, PS, and even engineering plastics such as PU, PA, and CA, instead of rubber, which has brought a new situation to the plastics industry.

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G5-V Wheel - Printing Parameters				
打印材料 (G5-TPE)	main ingredient	TPE	Test Date	2021.9.28
	Enhancer System	无	Particle diameter	2.0-3.0mm
Print temperature	Nozzle temperature	220℃	printing speed	30mm/s
	hot bed temperature	80℃	print layer height	0.4mm
Model size	120*120*51mm		Nozzle diameter	1mm
Bottom plate material	Semi-tempered carbon crystalline silicon glass		Infill	15%
Whether to use glue	是		Finished product	如右图所示
Print environment	敞开			
Actual print time	4h30min			
Finished product summary	The surface texture is relatively neat, rubber feel, high toughness, and elasticity. It is recommended to print in an incubator when printing larger models.			

耗材介绍五

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TPV

Thermoplastic vulcanizate (English as Thermoplastic Vulcanizate), referred to as TPV, thermoplastic vulcanizate in Chinese referred to as thermoplastic rubber (English Thermoplastic Rubber), referred to as TPR, but this name is easy to be confused with other types of thermoplastic elastomers (Thermoplastic Elastomer in English) Together, because thermoplastic elastomers are usually called thermoplastic rubbers, especially styrene elastomers, at least in China, it seems that "TPR" has become its proper name. When it comes to TPR, it refers to SBS, SEBS, etc. Styrenic elastomers are thermoplastic elastomers as base materials, which are inseparable from the large consumption of styrenic elastomers in the fields of civil and final consumer goods. TPV is mainly composed of two parts, one is plastic as a continuous phase, and the other is rubber as a dispersed phase. Usually rubber needs to be combined with softening oil or plasticizer. Vulcanizing agent and some auxiliary additives are also essential. In addition, some inorganic fillers will be added in order to reduce costs or improve performance in certain aspects.

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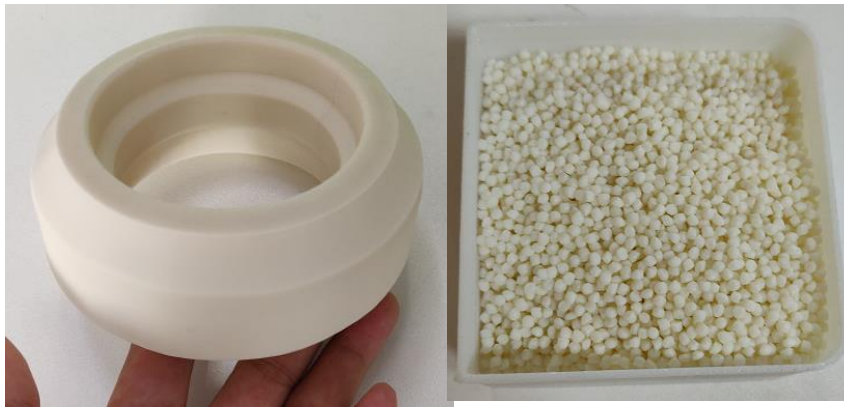
G5-V Wheel - Printing Parameters				
打印材料 (G5-TPV)	main ingredient	TPV	Test Date	2021.9.28
	Enhancer System	none	Particle diameter	2.0-3.0mm
Print temperature	Nozzle temperature	220℃	printing speed	30mm/s
	hot bed temperature	80℃	print layer height	0.4mm
Model size	120*120*51mm		Nozzle diameter	1mm
Bottom plate material	Semi-tempered carbon crystalline silicon glass		Infill	15%
Whether to use glue	Yes		Finished product	如右图所示
Print environment	敞开			
Actual print time	4h30min			
Finished product summary	The surface has neat texture, rubber feel, high toughness and elasticity. It is recommended to print in an incubator when printing larger models.			



耗材介绍六

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PLA

Polylactic acid, also known as polylactide, is a polyester polymer obtained by polymerizing lactic acid as the main raw material. It is a new type of biodegradable material. Polylactic acid has good thermal stability, the processing temperature is 170-230 °C, and it has good solvent resistance. It can be processed in various ways, such as extrusion, spinning, biaxial stretching, and injection blow molding. In addition to being biodegradable, products made of polylactic acid have good biocompatibility, gloss, transparency, hand feel and heat resistance.

打印案例一

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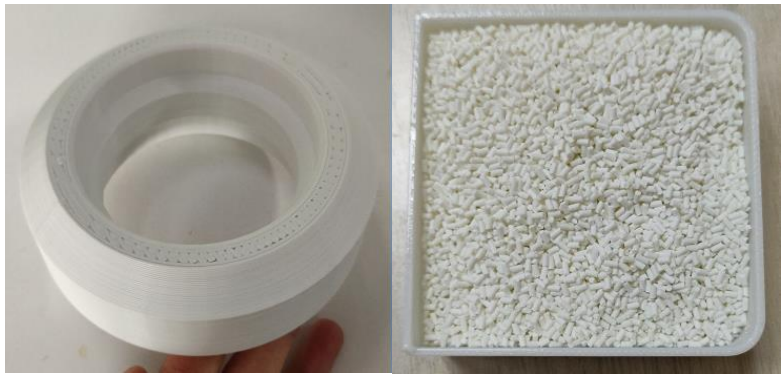
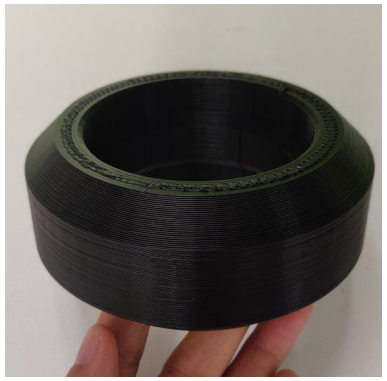
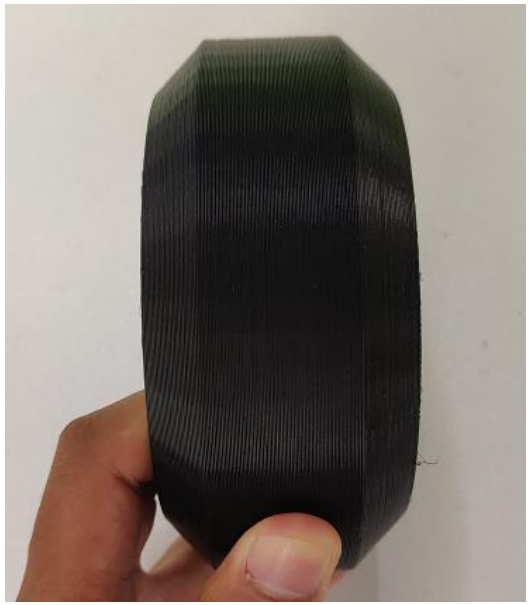
G5-V轮-打印参数				
打印材料 (G5-PLA-White)	main ingredient	PLA	Test Date	2021.9.28
	Enhancer System	none	Particle diameter	2.0-3.0mm
Print temperature	Nozzle temperature	200℃	printing speed	60mm/s
	hot bed temperature	60℃	print layer height	0.4mm
Model size	120*120*51mm		Nozzle diameter	1mm
Bottom plate material	Semi-tempered carbon crystalline silicon glass		Infill	15%
Whether to use glue	no		Finished product	As shown on the right
Print environment	open			
Actual print time	2h19min			
Finished product summary	The surface layer is neat, the line is uniform, and it is easy to print			



打印案例二

G5-V轮-打印参数				
打印材料 (G5-PLA-高碳)	main ingredient	PLA	Test Date	2021.9.28
	Enhancer System	无	Particle diameter	2.0-3.0mm
Print temperature	Nozzle temperature	200℃	printing speed	60mm/s
	hot bed temperature	60℃	print layer height	0.4mm
Model size	120*120*51mm		Nozzle diameter	1mm
Bottom plate material	半钢化碳晶硅玻璃		Infill	15%
Whether to use glue	否		Finished product	如右图所示
Print environment	敞开			
Actual print time	2h19min			
Finished product summary	表面层纹工整、出线均匀、易打印			





打印案例三

打印材料 (G5-PLA-wood plastic)	main ingredient	PLA	Test Date	2021.10.20
	Enhancer System	wood flour	Particle diameter	2.0-3.0mm
Print temperature	Nozzle temperature	180℃	printing speed	60mm/s
	hot bed temperature	60℃	print layer height	0.2mm
Model size	155*155*40mm		Nozzle diameter	0.6mm
Bottom plate material	Semi-tempered carbon crystalline silicon glass		Infill	22%
Whether to use glue	yES		Finished product	如右图所示
Print environment	open			
Actual print time	7h20min			
Finished product summary	The surface texture is relatively neat, the thread outlet is uniform, and the temperature should not be too high during printing, otherwise it will be easy to be out of material			

耗材介绍七

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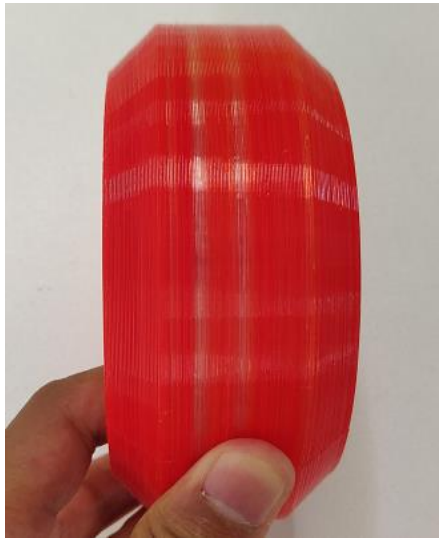
TPU

Thermoplastic polyurethane elastomer, also known as thermoplastic polyurethane rubber, referred to as TPU, is a (AB) n-type block linear polymer, A is polyester or polyether with high molecular weight (1000~6000), B is a linear polymer containing 2~12 A diol with chain carbon atoms, the chemical structure between the AB segments is a diisocyanate. Thermoplastic polyurethane rubber is cross-linked by intermolecular hydrogen bonds or lightly cross-linked between macromolecular chains. As the temperature increases or decreases, these two cross-linked structures are reversible. In the molten state or solution state, the intermolecular force weakens, and after cooling or solvent volatilization, there is a strong intermolecular force connecting together, restoring the performance of the original solid. Typical TPU such as spandex and so on. Thermoplastic polyurethane elastomer (TPU) is a kind of elastomer that can be plasticized by heating and dissolved by solvent. It has excellent comprehensive properties such as high strength, high toughness, wear resistance and oil resistance. It has good processing performance and is widely used in national defense, medical, Food and other industries.

G5-V Wheel - Printing Parameters				
printing material (G5-TPU)	main ingredient	TPU	Test Date	2021.9.28
	Enhancer System	none	Particle diameter	2.0-3.0mm
Print temperature	Nozzle temperature	220℃	printing speed	30mm/s
	hot bed temperature	80℃	print layer height	0.4mm
Model size	120*120*51mm		Nozzle diameter	1mm
Bottom plate material	Semi-tempered carbon crystalline silicon glass		Infill	15%
Whether to use glue	Yes		Finished product	As shown on the right (added red masterbatch)
Print environment	open			
Actual print time	4h30min			
Finished product summary	The surface layer is neat, the adhesion between layers is good, and it is easy to print			



耗材介绍八

ABS

ABS plastic is a terpolymer of three monomers, acrylonitrile (A), butadiene (B) and styrene (S). The relative content of the three monomers can be changed arbitrarily to make various resins. ABS plastic has the common properties of three components, A makes it resistant to chemical corrosion, heat resistance, and has a certain surface hardness, B makes it have high elasticity and toughness, and S makes it have the processing and molding characteristics of thermoplastics and improve electrical properties. performance. Therefore, ABS plastic is a kind of "tough, hard and rigid" material with easily available raw materials, good comprehensive performance, low price and wide application. ABS plastic has been widely used in machinery, electrical, textile, automobile, aircraft, ship and other manufacturing industries and chemical industry.

owl - print parameters				
printing material(G5-ABS)	main ingredient	ABS	Test Date	2021.9.28
	Enhancer System	none	Particle diameter	2.0-3.0mm
Print temperature	Nozzle temperature	250℃	printing speed	50mm/s
	hot bed temperature	110℃	print layer height	0.4mm
Model size	173*167*150mm		Nozzle diameter	1.5mm
Bottom plate material	Semi-tempered carbon crystalline silicon glass		Infill	25%
Whether to use glue	Yes		Finished product	如右图所示
Print environment	Open FOR SMALL PARTS, CLOSED FOR LARGE PARTS			
Actual print time	7h30min			
Finished product summary	The surface layer is neat, the adhesion between layers is good, and the edges are easy to warp. When printing large-scale models, it is recommended to print in a thermal insulation cover.			

PETG

PETG plastic is a kind of transparent plastic in short, it is an amorphous copolyester. The common comonomer of PETG is 1,4-cyclohexanedimethanol (CHDM), the full name is polyethylene terephthalate. Alcohol ester-1,4-cyclohexanedimethanol ester. PETG is an amorphous copolyester. With the increase of CHDM in the copolymer, the melting point decreases, the glass transition temperature increases, the crystallinity decreases, and finally an amorphous polymer is formed. Generally, the content of CHDM in PETG is 30%-40%. Has good viscosity, transparency, color, chemical resistance, and resistance to stress whitening. Quickly thermoformed or extrusion blow molded. Viscosity is better than acrylic (acrylic). Its products are highly transparent and have excellent impact resistance. It is especially suitable for forming thick-walled transparent products. Its processing and forming performance is excellent, and it can be designed in any shape according to the designer's intention. Traditional extrusion, injection molding, blow molding and suction can be used. Plastic and other molding methods， t can be widely used in the market of sheet material, high-performance shrink film, bottle and profile material, etc. At the same time, its secondary processing performance is excellent, and conventional machining can be carried out. PETG is an amorphous copolyester. Its products are highly transparent and have excellent impact resistance. It is especially suitable for forming thick-walled transparent products. Traditional molding methods such as extrusion, injection molding, blow molding and blister molding can be widely used in the market of sheet materials, high-performance shrink films, bottles and profiles, and cosmetic packaging. Regular machining finishes. The main domestic agents of Eastman PETG and other products currently have Shanghai Lianmo Chemical Co., Ltd.

打印案例一

火箭-打印参数				
打印材料 (G5-PETG)	main ingredient	PETG	Test Date	2021.9.28
	Enhancer System	无	Particle diameter	2.0-3.0mm
Print temperature	Nozzle temperature	230℃	printing speed	50mm/s
	hot bed temperature	90℃	print layer height	0.4mm
Model size	204*120*500mm		Nozzle diameter	1.5mm
Bottom plate material	半钢化碳晶硅玻璃		Infill	0%（螺旋打印）
Whether to use glue	是		Finished product	如右图所示
Print environment	敞开			
Actual print time	5h			
Finished product summary	表面层纹工整、层与层之间的粘结力好、需要调整料筒散热风扇打印速度及温度之间达到一定平衡、打印难度中等			

打印案例二

打印材料 (G5-PETG-10)	main ingredient	PETG	Test Date	2021.9.28
	Enhancer System	10% glassfiber	Particle diameter	2.0-3.0mm
Print temperature	Nozzle temperature	250℃	printing speed	50mm/s
	hot bed temperature	100℃	print layer height	0.4mm
Model size	480*253*450mm		Nozzle diameter	1.5mm
Bottom plate material	Semi-tempered carbon crystalline silicon glass		Infill	25%
Whether to use glue	Yes		Finished product	如右图所示
Print environment	open		Test Date	
Actual print time	52h		Particle diameter	
Finished product summary	The surface layer is neat, the adhesion between layers is good, and the edges are easy to warp. When printing large-scale models, it is recommended to print in a thermal insulation cover.			

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15-5PH

15-5PH stainless steel, also known as precipitation hardening stainless steel, is a martensitic precipitation hardening stainless steel, with good processability, excellent mechanical properties, resistance to general corrosive environments, good strength, toughness and ductility, hardness and corrosion resistance. The same as 304 stainless steel it is good. 15-5PH may be used to treat or heat treat conditions to obtain various properties. Machining can be carried out under a variety of achievable conditions, however the H1150M has the best service life in this condition. Applications: Aerospace, aircraft parts, components manufacturing high pressure valves and other corrosive environments, grooves, fasteners, equipment and equipment. ●15-5PH chemical composition①: Carbon C: ≤0.07 Manganese Mn: ≤1.00 Silicon Si: ≤1.00 Chromium Cr: 14.0~15.5 Nickel Ni②: 3.5~5.5 Phosphorus P: ≤0.04 Sulfur S: ≤0.03 Copper Cu: 2.5~4.5 Niobium+Tantalum Nb+Ta: 0.15~0.45 Note: ①A single value is the highest value unless otherwise specified; ②When used in some pipe-making processes, the nickel content of some types of austenitic stainless steel must be slightly higher than the value shown in the table.

Print case one

Industrial Parts - Printing Parameters				
printing material (G5-15-5PH)	main ingredient	15-5PH	Test Date	2021.11.16
	Enhancer System		Particle diameter	2.0-3.0mm
Print temperature	Nozzle temperature	235℃	printing speed	25mm/s
	hot bed temperature	110℃	print layer height	0.2mm
Model size	80*71*54.5mm		Nozzle diameter	0.4mm
Bottom plate material	Semi-tempered carbon crystalline silicon glass		Infill	100%
Whether to use glue	Yes		Finished product	如右图所示
Print environment	cooler box			
Actual print time	8h			
Finished product summary	The surface texture is slightly poor, the extrusion amount needs to be adjusted, and it is not easy to print