aeCoating™ FDM Printing Material
Technical Data Sheet

aeCoating™ NexPA-GF25

Nylon filament with Co-extrusion skin-core structure and 25% chopped glass fiber to improve its thermal and mechanical properties.

共挤包覆结构 25%短切玻璃纤维增强高温尼龙 3D 打印材料。

Product Advantages

产品亮点

- **Co-Extrusion 'Skin-Core' Structure**

Phaetus® invented a new generation of industrial 3D printing filament with a skin-core structurer by using multi-layer co-extrusion technology. The outer "skin" of the filament is a modified resin with high layer adhesion, and the inner core is reinforced resin containing high chopped fiber content. The co-extrusion skin-core technology has greatly increased fiber content while maintaining the toughness of the filament and thus improved the mechanical properties and heat resistance of the printed parts.

- 增强纤维包覆技术

使用多层共挤技术，开发出具有双层包覆结构的新一代工业级 3D 打印线材，线材外层为高粘接强度的改性纯树脂材料，内芯为高含量的短切纤维增强改性树脂材料。得益于共挤包覆技术，在同等线材韧性条件下，线材内部的纤维含量可以大幅度提高，使最终的打印零部件获得更强的机械性能与耐热性。

- **Excellent Layer Adhesion**

aeCoating™ 3D printing filaments have taken advantage of the general laminar flow of polymeric fluids during the extrusion and maintain the stable skin-core structure even after the filament passes through the nozzle of the printer. Among many other fiber-reinforced filaments, Z-axis layer adhesion loss is always a common issue during printing. However, for FusCoating™ 3D printing filaments, the Z-axis interlayer adhesion comes from the adhesion between the resin of the outer shell and this can completely avoid the layer adhesion loss. In addition, after being extruded through the nozzle, the inner core and outer layers of the extruded filament are heated, melted and bonded together again. In this way, the adhesion between the inner and outer layers can reach the optimal level and the fibers of the inner core can effectively withstand the force from the z-axis outer layer resin. With these two advantages, the Z-axis interlayer adhesion of final parts printed with FusCoating™ is further improved compared to parts printed with

pure resin filaments.

- 优异的层间强度

aeCoating™ 新一代工业级 3D 打印线材利用了高分子流体在挤出过程中一般为层流运动的特性，线材在经过打印机热端喷头后，仍能保持稳定的双层包覆结构。打印时的 Z 轴层间粘接方向可以始终保持为外层的纯树脂之间粘接，彻底避免了普通纤维增强材料会损失 Z 轴层间粘接强度的缺点。并且经过喷头挤出后，挤出丝的内外层经过二次加热熔融，使内外层之间的结合力达到最佳，内层纤维可以有效承受经外层树脂传导的来自 Z 轴方向的力，使得最终打印零部件的 Z 轴层间强度相比纯树脂材料进一步提高。

- **Reduced Nozzle Abrasive Wear**

During the extrusion process, the aeCoating™ can greatly reduce the wear of the nozzle. The material that contacts the inner wall of the nozzle is made of pure resin which greatly limits the contact between the reinforcing fibers and the nozzle. At the same time, the skin-core structured filament can also avoid the contact between the reinforcing fibers of the filament and extruders or throats, which prolongs the service life of the entire extrusion parts of the 3D printer.

- 降低对挤出端喷嘴的磨损

aeCoating™ 新一代工业级 3D 打印线材在挤出过程中，线材熔体在喷头内部始终保持层流状态，与喷头内壁接触部分为纯树脂材料，大幅减少了增强纤维直接与喷头内壁直接接触的情况，有效降低了喷头磨损。同时包覆结构线材也避免了线材内的增强纤维与挤出轮和喉管内壁产生摩擦，延长了 3D 打印机整个挤出组件的使用寿命

Product Description

产品简介

aeCoating™ NexPA-GF25 is an outstanding candidate for printing parts that need to have thin walls and high mechanical property requirements. It is one type of 3D printing filament with 25% glass fiber content and a skin-core structure. The outer ‘skin’ of the filament is a modified resin with high layer adhesion strength, and the inner core is reinforced resin containing high chopped fiber content. aeCoating™ 3D printing filaments take advantage of the general laminar flow of polymeric fluids during extrusion and maintain the stable skin-core structure even after the filament passes through the nozzle of the printer. This technology contributes to the excellent Z-axis interlayer adhesion of FDM fiber-reinforced filaments because the major layer adhesion comes from the outer shell rein without fibers. Meanwhile, 25% chopped glass fiber content can improve the mechanical properties and heat resistance of the printed parts.

aeCoating™ NexPA-GF25 是一款具有双层包覆结构的 25%玻璃纤维增强高温尼龙 3D 打印线材。线材外层为高粘接强度的纯尼龙树脂，线材内芯为短切玻璃纤维增强的高温尼龙。aeCoating™ 3D 打印包覆线材利用了高分子

熔体在挤出过程中一般为层流运动的特性，线材在通过打印机喷头后仍能保持稳定的双层包覆结构，打印时的 Z 轴层间方向可以始终保持为外层的纯树脂之间粘接，大幅度提高了纤维增强类 FDM 材料的 Z 轴层间强度，同时 25%填充含量的短切玻璃纤维又进一步提高了打印零部件件的整体机械性能与耐热性，非常适合打印薄壁类和高机械性能要求的零部件。

Available

产品详情

Color: Black/Orange/Red/Army Green/Green/Purple/Blue/Yellow/Grey

颜色：黑色/橙色/红色/军绿色/绿色/紫色/蓝色/黄色/灰色

Diameter: 1.75mm

Net wet: 500g, 1KG, 2KG, 2.5KG, 3KG

Material Properties

物性表

测试项目 **Property**	**测试方法** **Test Method**	**典型值** **Typical value**		
密度 Density	ISO 1183	1.29g/cm³		
饱和吸湿率 Water absorption	ISO 62: Method 1	1.99 %		
熔点 Melting Temperature	ISO 11357	237°C		
熔融指数 Melt index	300°C, 2.16kg	5.5 g/10min		
		未退火 **Unannealed**	**退火后** **Annealed**	**退火后** **饱和吸湿处理** **Saturation Hygroscopic Treatment after Annealed**
热变形温度 Determination of temperature	ISO 75: Method A (0.45 MPa)	86°C	195.5°C	195.2°C

	ISO 75: Method B (1.80 MPa)	79.2°C	118.0°C	96.9°C
拉伸强度（X-Y） Tensile strength(X-Y)	ISO 527	96.82 ± 1.07 MPa	105.01 ±1.14 MPa	72.12 ± 0.83 MPa
拉伸模量（X-Y） Young's modulus(X-Y)		5400.57 ± 227.21 MPa	5729.78 ± 301.68 MPa	4587.29 ± 206.31 MPa
断裂伸长率（X-Y） Elongation at break (X-Y)		2.92 ± 0.13 %	2.41 ± 0.05 %	6.48 ± 0.38 %
弯曲强度（X-Y） Bending strength (X-Y)	ISO 178	161.99 ± 2.39 MPa	168.2 ± 4.76 MPa	102.64 ± 1.18MPa
弯曲模量 （X-Y） Bending modulus (X-Y)		5402.49 ± 123.21 MPa	5957.97 ± 95.66MPa	3228.36 ± 252.82 MPa
缺口冲击强度 （X-Y） Charpy impact strength （X-Y）	ISO 179	12.55 ± 0.86KJ/㎡	7.59 ± 0.81 KJ/㎡	22.02 ± 1.47 KJ/㎡
拉伸强度 (Z) Tensile strength (Z)	ISO 527	65.40 ± 2.99 MPa	/	/
拉伸模量（Z） Young's modulus (Z)		4150.79±80.04 MPa	/	/
断裂伸长率（Z） Elongation at break (Z)		1.90 ± 0.15 %	/	/

试样打印参数：喷嘴温度 340℃，底板加热 80℃，打印速度 45mm/s，填充率 100%，填充角度±45°

退火条件：100℃退火 8 小时

Specimens printed under the following conditions: Nozzle temp 340℃, Bed temp 80℃, Print speed 45mm/s, Infill 100%, Infill angle ±45°

Post-processing: 100°C Annealing 8 hours

Recommended Printing Conditions

建议打印参数

喷头温度 Nozzle Temperature	300-340℃
建议喷嘴大小 Recommended Nozzle Diameter	0.4-1.0mm

建议底板材质 Recommended build surface treatment	PEI 底板或者涂抹 PVP 固体胶 PEI or Coating with PVP glue
底板温度 Build plate temperature	70-80℃
Raft 间距 Raft separation distance	0.08-0.12 mm
冷却风扇 Cooling fan speed	关闭 Off
打印速度 Print speed	30-120 mm/s
回抽距离 Retraction distance	1-3 mm
回抽速度 Retraction speed	1800-3600 mm/min
建议支撑材料 Recommended support material	aeSupport™ S-PAHT Quick-Remove Support

其他建议：

Additional Suggestions：

1. 尼龙材料非常容易吸收环境内的水分，吸湿后打印会出现拉丝，挤出有气泡等现象，降低打印质量。建议您打开 aeCoating™ NexPA-GF25 真空铝箔袋包装后立即将线材放入干燥盒内（湿度控制在 15%以下）进行打印。不用的线材请放回原包装铝箔袋内密封保存。

   Nylon material is very easy to absorb moisture within the environment, and printing after absorbing moisture will result oozing, extruding with bubbles and rough surface appearance, thus reducing print quality. It is recommended that put the filament into a dry box (humidity below 15%) immediately after opening the aeCoating™ NexPA-GF25 vacuum foil bag for printing. Please put the unused filament back into the original aluminum foil bag for sealed storage.

2. 材料受潮后会出现打印拉丝增多，挤出有气泡，打印表面质量粗糙等现象。请将线材放入 80-100℃烘箱内干燥 4-6h，即可恢复 aeCoating™ NexPA-GF25 的打印质量。

   After the material is damp, there will be more printing oozing, bubbles extruded and rough printing surface. Please dry the filament in an oven at 80-100℃ for 4-6h to restore the printing quality of aeCoating™ NexPA-GF25.

3. 建议选用 Phaetus 硬化钢及以上等级喷嘴，可以有效提高打印质量，建议加热块厚度不小于 12mm。

   It is recommended to use Phaetus hardened steel and above grade nozzles, which can effectively improve the print quality.

Besides, it is recommended that the thickness of the heating block is longer 12mm.

4. 打印完成后可以对打印件进行退火处理，可以进一步提高 aeCoating™ NexPA-GF25 打印件的强度（退火条件：80-100℃温度下放置 4-8 小时后取出即可）。

After the printing is completed, the aeCoating™ NexPA-GF25 printed part can be annealed to further improve the strength of print part.

Annealing conditions: leave printing part in an oven at 80-100℃ for 4 to 8 hours and cool to room temperature naturally.

Extrusion Force vs Print Speed Test

建议打印参数挤出压力与打印测试报告