FusRock® FDM Printing Material

Technical Data Sheet

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FusCoating™ NexABS-CF20

共挤包覆结构的 20%短切碳纤维增强 ABS 3D 打印材料。

FusCoating™ NexABS-CF20 is one type 3D printing ABS filament with co-extrusion skin-core structure and 20% Carbon fiber to improve its mechanical properties.

产品亮点

Product Advantage

- **增强纤维包覆技术**
  FusRock®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。
- **Co-extrusion 'skin-core' structure**
  FusRock® is a new generation of industrial 3D printing filament with a skin-core structure 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 as well as heat resistance of printed parts.

- **优异的层间强度**
  FusCoating™ 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。
- **Excellent layer adhesion**
  FusCoating™ 3D printing filaments have taken advantage of the laminar flow of polymeric fluids during the extrusion process 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 interlayer adhesion in Z-axis comes from the adhesion between the resin of the outer shell and this can completely avoid the layer adhesion loss caused by the fibers added. In addition, after being extruded through the nozzle, the inner core and outer layer of the filament are heated, melted and bonded together again. In this way, the adhesion between the core and skin can reach the optimal level and the fibers of the inner core can effectively withstand the force from outer layer resin in Z-axis. With these advantages, the Z-axis interlayer adhesion of the parts printed with FusCoating™ is further improved compared with those printed with pure resin filaments.

- **降低挤出端磨损**
  FusCoating™ 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。
- **Reducing nozzle abrasive wear**
  During the extrusion process, the FusCoating™ can greatly reduce the wear of the nozzle. The material that slides against 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 help to avoid 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.

- **低气味**
  FusCoating™ NexABS-CF20 基体是一款由连续本体法合成的 ABS 树脂，得益于这种先进的生产工艺，生产过程中使用的溶剂和单体在最终 ABS 成品中的残留量极低，因此材料在打印过程中的相比普通 ABS 释放的 voc 更低。
- **Odorless**
  The main raw material of FusCoating™ NexABS-CF20 is an ABS resin synthesized by continuous bulk polymerization technique. Thanks to this advanced production process, the residual amount of solvents and monomers used in the production process in the final ABS product is so low that the filament has a low odor during printing.

产品介绍

Product Description

FusCoating™ NexABS-CF20 是一款具有双层包覆结构的 20%碳纤维增强 ABS 3D 打印线材。线材外层为高粘接强度的纯 ABS 树脂，线材内芯为 20%短切碳纤维增强的 ABS 树脂。FusCoating™ NexABS-CF20 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。

FusCoating™ NexABS-CF20 is a carbon fiber reinforced ABS material with a skin-core structure. The inner core is ABS reinforced with 20% chopped carbon fiber, and the outer shell is unfilled ABS resin with high bond strength.

The polymer fluid is always in a laminar flow state in the throat and nozzle so the skin-core structure of filaments can be maintained even after being extruded through the nozzle. This skin-core structure not only contributes to the low shrinkage, warpage resistance and excellent mechanical properties which ordinary fiber-reinforced materials have, but stronger interlayer bonding performance for printed parts as well. It has fixed the defect that the ordinary fiber-reinforced material will lose the bonding strength between layers. Meanwhile, there is no floating fiber on the surface of the printed part, and the surface presents a bright matte texture.

产品详情

Available

颜色 Color：黑色 Black
线径 Diameter：1.75mm
净重 Net wet：500g，1kg，2.5kg，3kg

物性表（v1.0）

Material Properties

测试项目 Property	测试方法 Testing method	典型值 Typical value
密度 Density	ISO 1183	1.09 g/cm³
熔融指数 Melt index	250°C, 2.16kg	5.5 g/10min
热变形温度 Determination of temperature	ISO 75: Method A	83 °C (1.80MPa)
	ISO 75: Method B	90 °C (0.45MPa)
拉伸强度（X-Y） Tensile strength(X-Y)	ISO 527	47.86±2.32 Mpa
拉伸模量（X-Y） Young's modulus(X-Y)		4606.28±192.38 Mpa
断裂伸长率（X-Y） Elongation at break (X-Y)		1.48±0.11 %
弯曲强度（X-Y） Bending strength (X-Y)	ISO 178	80.21±0.55 Mpa
弯曲模量 （X-Y） Bending modulus (X-Y)		4365.29±153.79 Mpa
缺口冲击强度 （X-Y） Charpy impact strength （X-Y）	ISO 179	8.12±0.78 KJ/㎡
拉伸强度（Z） Tensile strength (Z)	ISO 527	28.21±0.35 MPa
拉伸模量（Z） Young's modulus (Z)		2713.50±88.38 MPa
断裂伸长率（Z） Elongation at break (Z)		1.81±0.16 %
弯曲强度（Z） Bending strength（Z）	ISO 178	48.56±0.55 MPa
弯曲模量（Z） Bending modulus（Z）		2746.57±58.33 MPa

试样打印参数：喷嘴温度 270°C，底板加热 100°C，打印速度 100mm/s，填充率 100%，填充角度±45°

Specimens printed under the following conditions: Nozzle temp 270°C, Bed temp 100°C, Print speed 100mm/s, Infill 100%, Infill angle ±45°

建议打印参数

Recommended printing conditions

喷头温度 Nozzle Temperature	250-280°C
建议喷嘴大小 Recommended Nozzle Diameter	0.4-1.0 mm
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	100-110°C
Raft 间距 Raft separation distance	0.18-0.2 mm
冷却风扇 Cooling fan speed	0%-20%
打印速度 Print speed	30-200 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	FusFree™ S-Multi Quick-Remove Support Material

其他建议：

1. FusCoating™ NexABS-CF20 对比普通 ABS 纤维增强材料拥有更高的纤维含量，这种技术进一步提高了 ABS 材料的抗翘曲能力和刚性，因此可以适当降低环境温度以达到节能的目的。
2. 长期打开包装后的线材，如打印过程中发现气泡、拉丝等打印质量下降问题，请将线材置于 60-70°C 条件下干燥 4-6h。
3. 建议在打印 ABS 材料时将打印机放置在通风环境中。
4. FusCoating™ NexABS-CF20 基于熔体稳定流动时处于层流状态的机理，材料在喷嘴挤出的细丝结构中依然能保持双层结构。但当打印速度过高时，熔体流动状态将变得不稳定，耗材在喷嘴挤出后的细丝将会破坏双层结构，最终导致打印件的表面质量变得粗糙。当出现此现象时建议提高打印温度或降低挤出速度。
5. 建议使用 Phaetus 硬化钢及以上等级耐磨喷头，可以有效提高打印质量，建议加热块厚度不小 12mm。

Additional Suggestions：

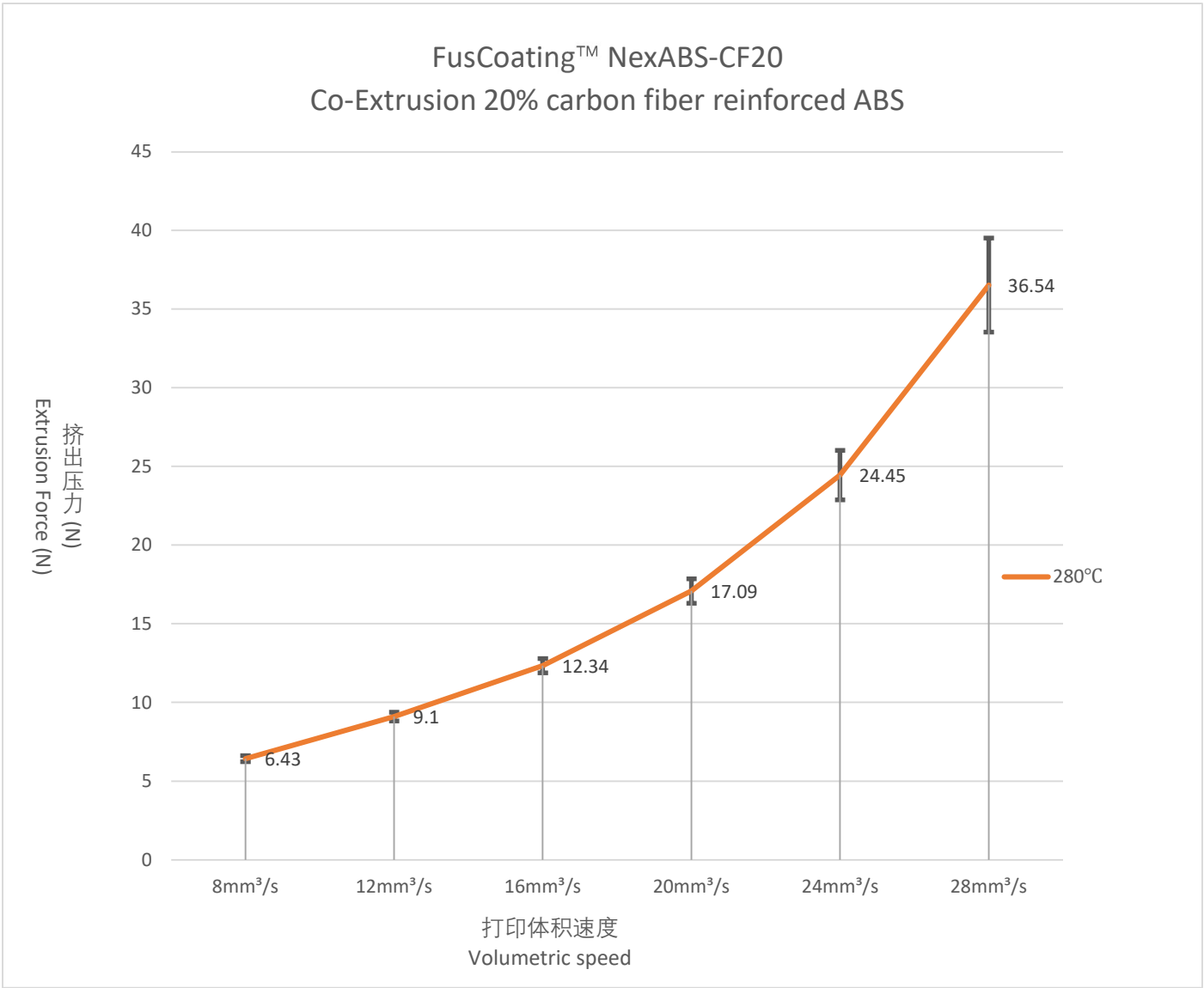
1. **FusCoating™ NexABS-CF20 has a higher fiber content compared with ordinary ABS-GF/CF. This technology further improves the warping resistance and rigidity of ABS materials, so the chamber temperature can be properly reduced to achieve energy saving.**
2. **If the filament has been opened for a long time and problems such as air bubbles and stringing appear during the printing process, please dry the filament at 60-70°C for 4-6 hours.**
3. **It is recommended to place the printer in a well-ventilated environment when printing with ABS**

material.

4. **FusCoating™ NexABS-CF25 can maintain a core-skin structure when extruded from the nozzle. It is based on the mechanism that the melt polymer is in a laminar state when it flows stably, However, when the printing speed is too high, the melt flow state will become unstable, and the filaments extruded from the nozzle will no longer have the skin-core structure anymore, which can cause the rough surface of the printed part. When this phenomenon occurs, it is recommended to increase the printing temperature or reduce the extrusion speed.**
5. **It is recommended to use Phaetus hardened steel nozzles or nozzles with greater abrasion resistance, which can effectively improve the printing quality. The thickness of the heating block is recommended to be no less than 12mm.**

挤出压力与打印流量速度测试

Extrusion Force vs Print Volumetric Speed Test



测试参数：12mm 长度铜制加热块，BMG 挤出机，Phaetus 硬化钢喷头，喷嘴大小 0.4mm，层高 0.2mm。

Test parameters: 12mm length brass heat block, BMG extruder, Phaetus Hardened Steel Nozzle, Nozzle size 0.4mm, Layer Height 0.2mm.

免责声明

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