CFsys™ FDM Printing Material
Technical Data Sheet

CFsys™ A TPU-Aero

主动发泡轻量化柔性3D打印材料。

Active foaming low weight TPU 3D print material.

产品介绍 Product Description

CFSYS™ A TPU-Aero是一款专为FFF打印技术开发的中等硬度主动发泡型柔性材料，通过控制打印温度，可以实现不同的挤出发泡倍率，最终呈现出不同的减重和柔软度效果。FusFlexTMTPU-Aero打印件表面硬度可控制在65A-85A之间。在最大发泡率下，FusFlexTM TPU-Aero相比普通TPU材料可以减重50%，打印表面具有出色的类布艺质感。

CFSYS™ A TPU-Aero is a medium-hardness, active foaming flexible material specifically developed for FFF printing technology. By controlling the printing temperature, different extrusion foaming ratios can be achieved,resulting in varying weight reduction and softness effects. The surface hardness of CFSYS™ A TPU-Aero printed parts can be controlled between 65A and 85A. At the maximum foaming rate, CFSYS™ A TPU-Aero can reduce weight by 50% compared to ordinary TPU materials, with the printed surface exhibiting an excellent fabric-like texture.

产品亮点 Product Advantages

- **主动发泡技术**

  CFSYS™ A TPU-Aero是一款在打印过程中进行发泡的柔性TPU材料。CFsys®通过特殊的挤出加工工艺，将发泡组分在未激活的状态下均匀分布在TPU基材内部，使得整卷产品重量仍然保持在1kg，未有减少。在打印过程中通过调节打印温度可以自由控制发泡组分的膨胀倍率，实现不同的减重和柔软度效果，满足不同应用要求。

- **Active Foaming Technology**

CFSYS™ A TPU-Aero is a flexible TPU material that foams during the printing process. CFsys® uses a special extrusion processing technique to uniformly distribute the foaming components within the TPU matrix in an unactivated state, ensuring that the entire spool of material remains at 1kg without weight reduction. By adjusting the printing temperature, the expansion ratio of the foaming components can be freely controlled, achieving different weight reduction and softness effects tomeet various application requirements.

- **易于打印**

CFSYS™ A TPU-Aero通过特殊的挤出加工工艺，避免了发泡组分在线材内发泡后会大幅度降低线材硬度的缺陷。未激活的发泡组分充当刚性颗粒均匀分布在TPU基材内，有效提高了CFSYS™ A TPU-Aero线材的表面硬度，降低了打印难度。CFSYS™ A TPU-Aero兼容大部分打印机打印，最大挤出流量可达12mm³/s。

- **Low Mositure Sensitivity**

CFSYS™ A TPU-Aero avoids the defect of significantly reduced filament hardness after foaming by using a special extrusion processing technique. The unactivated foaming components act as rigid particles uniformly distributed within the TPU matrix, effectively increasing the surface hardness of the CFSYS™ A TPU-Aero filament and reducing printing difficulty. CFSYS™ A TPU-Aero is compatible with most printers, with a maximum extrusion flow rate of 12mm³/s.

产品详情 Available

颜色 Color：白色White / 黑色Black / 绿色Green

线径 Diameter：1.75mm

净重 Net Wet：1kg

物性表 Material Properties

测试项目 Property	测试方法 Test Method	典型值 Typical value
线材密度 Filament Density	ISO 1183	1.15 g/cm³
熔融指数 Melt index	190°C, 2.16kg	8
饱和吸湿率 Water absorption	ISO 62: Method 1	5.82 %

打印件机械性能 Mechanical Properties of Printed Specimens

样条打印温度/Specimens print temperature		240℃	250℃	260℃	270℃
设定挤出量/Flow ratio		0.88	0.68	0.58	0.50
打印件密度 Print parts density	ISO 845	0.93g/cm³	0.74g/cm³	0.62g/cm³	0.54g/cm³
维卡软化点Vicat softening temperature	ISO 306	78.8℃	70.4℃	61.8℃	50.3℃
硬度 Hardness	ISO 7619	82A	75A	72A	66A
回弹性 Bayshore rebound	ASTMD2632	40%	40%	39%	40%
拉伸屈服强度（X-Y） Tensile yield strength	ISO 1798	5.98±0.10 MPa	4.23±0.04 MPa	3.22±0.05 MPa	3.59±0.11 MPa
拉伸断裂强度（X-Y）Tensile breaking strength		9.80±0.42 MPa	6.81±0.11 MPa	4.77±0.16 MPa	3.59±0.11 MPa
断裂伸长率 (X-Y) elongation at break (X-Y)		5.98±72.20 %	576.27±8.48 %	520.54±32.31 %	452.13±19.4 %

试样打印参数:喷嘴大小0.4mm，底板加热45C，打印速度60mm/s，填充率100%，填充角度±45°

Specimens printed under the following conditions: Nozzle size 0.4 mm,Bed temp 45C, Print speed 60mm/s, Infill 100%,Infill angle ±45°

建议打印参数 Recommended printing conditions

喷头温度 Nozzle Temperature	230-270°C
建议喷嘴大小 Recommended Nozzle Diameter	0.4-0.8mm
建议底板材质 Recommended build surface treatment	Glass, PC Film or Steel Plate
底板温度 Build plate temperature	30-45°C
冷却风扇 Cooling fan speed	On
打印速度 Print speed	＜100 mm/s
回抽距离 Retraction distance	0 mm or off

Additional Suggestions:

1. TPU material is easy to absorb moisture when exposed to the air, we suggest that you put the filaments into a dry box (humidity control below 15%)for printing immediately after you open the CFSYS^{TM} A TPU-Aero vacuum foil pouch, and put the unused filament back into the original foil pouch for sealing and storage.
2. For the CFSYS^{TM} A TPU-Aero filaments that has been exposed to air for a long time, please put the filaments into the 70-80℃ oven to dry it for 4-6h before printing, to avoid the material from being humid and making the extruded line with air bubbles, holes, stringing appear and other problems.
3. As foaming materials expand continuously when heated in the hot-end melt chamber, material leakage is inevitable during idle moves. Even adjusting the retraction distance and speed cannot improve this situation.It is recommended to turn off the retraction function in the slicing software, print only one model at a time, or use the print-one-by-one function. This can reduce stringing and material leakage defects caused by long-distance idle moves and jumps.

其他建议：

1. TPU材料暴露在空气中容易吸收水分,建议您打开CFSYS^{TM} A TPU-Aero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。
2. 长时间暴露于空气中的CFSYS^{TM} A TPU-Aero线材，请先将线材放入70-80℃烘箱内干燥4-6h后进行打印，避免材料潮湿使得挤出线条中存在气泡、孔洞，拉丝等问题。
3. 由于发泡类材料在热端融腔内受热会不断膨胀，空驶时会不可避免的出现漏料情况，即使调节回抽距离和回抽速度也无法改善，建议在切片软件中关闭回抽功能，一次仅打印单个模型或使用逐件打印功能，减少因长距离空驶和跳跃造成的拉丝和漏料缺陷。