



CMSA 2014 **FDM&OBJET技術 最新材料應用**

普立得科技

2014年3月21日



- 公司简介
- Nylon-12
- 彩色複合材料



我们的服务对象



能够借助3D打印进行**产品开发**的**工程师与设计师**。

我们帮助设计师们**完善创意**。

我们帮助**制造商们改进**制造方式。

我们**转变**个人、团队和机构**的工作方式**。

我们的服务对象 部分客户



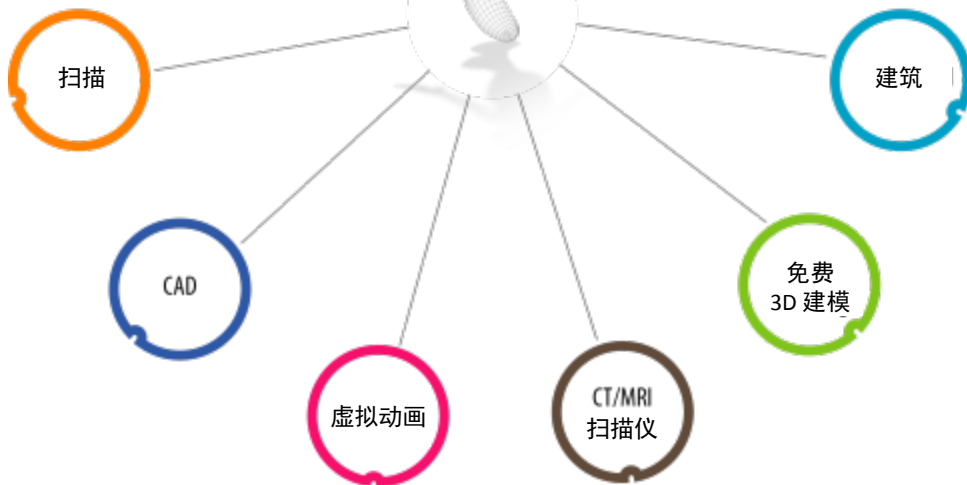
我们的服务对象



3D 打印模型



3D 文件



缩短产品上市的时间.....

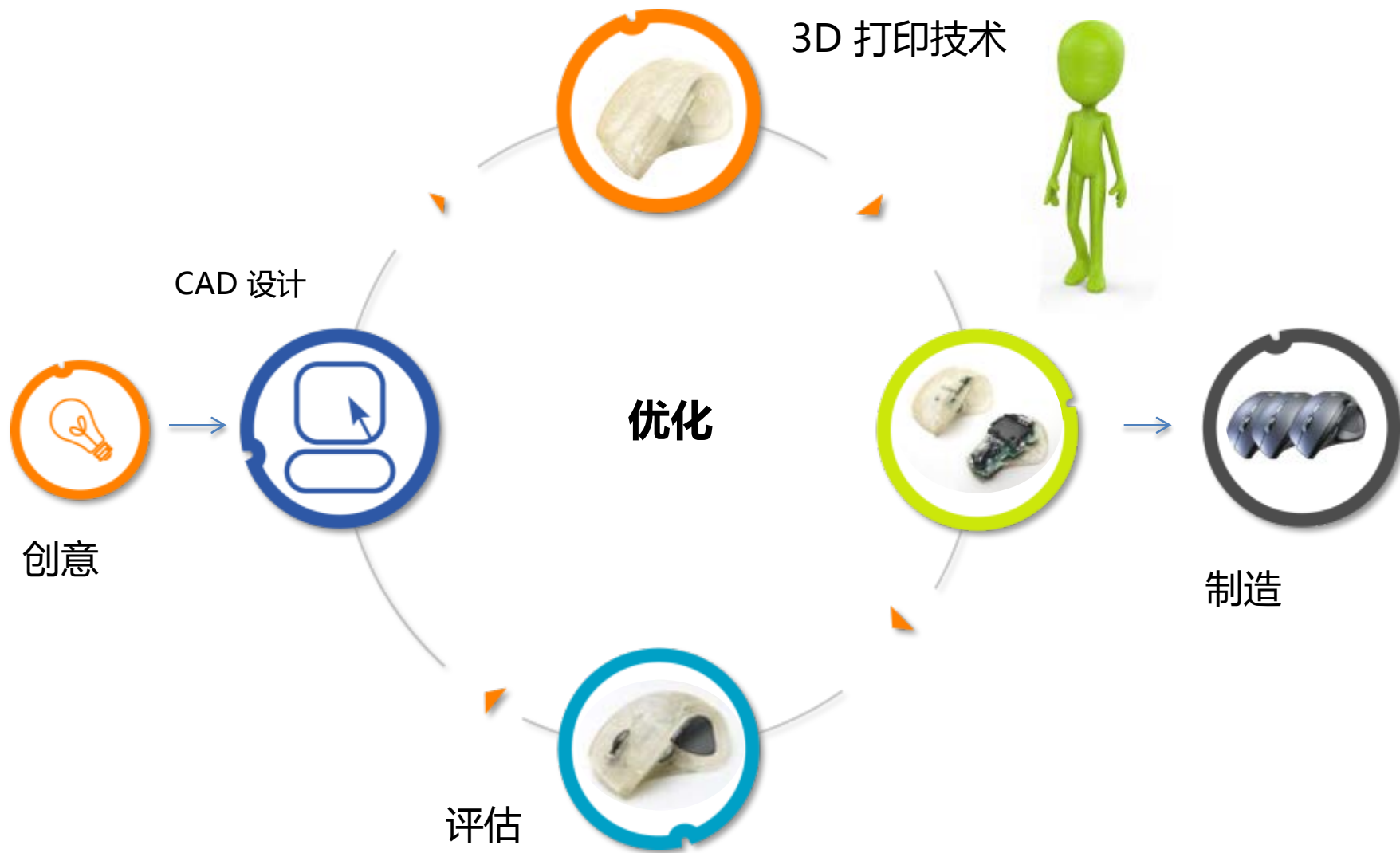
降低成本.....

提高创造力.....

维护内部机密性

3D 打印可以帮助客户实现
以上所有需求

我们的服务对象



我们的服务对象



FDM Nylon 12

3
Product series



Introducing FDM Nylon 12

The toughest materials in additive manufacturing just got tougher

- Highest elongation at break
- Highest impact strength
- Good chemical resistance

Flexible material enables new applications

- Pressed metal inserts
- Snap fits
- Living hinges
- Fatigue resistant parts



FDM Nylon 12

Unique Material Features

- High Elongation at Break: +30%
- High Z Strength: > 90% isotropic
- Excellent fatigue resistance
- Moderate chemical resistance
- High impact resistance
- Good HDT*: 82° C



* HDT after annealing part at 140° C for 2hrs

FDM Nylon 12

Product Details:

- Fortus 360mc ; 400mc ; 900mc compatible
- New Material Option is required
- 0.178mm, 0.254mm, 0.333mm slice thickness
- SR-110 Soluble Support (similar to SR-100)
- Black color available
- Engineering Plastics (PC) pricing

System Availability	Support Technology
360mc	Soluble
400mc	
900mc	

FDM Material Comparison

Technology Material	Elongation @ Break	Tensile Strength	Flexural Modulus	Izod Impact		HDT @264 psi (Heat Def. Temp)
				Notched	Unnotched	
FDM Nylon 12	30%	7,000 psi (48 MPa)	190 ksi (1310 MPa)	3.17 ft-lb/in (200 J/m)	>37.4 ft-lb/in (>2000 J/m)	82° C*
ABS-M30	4%	5,200 psi (36 MPa)	336 ksi (2300 MPa)	2.6 ft-lb/in (139 J/m)	5.3 ft-lb/in (283 J/m)	82° C
PC-ABS	6%	5,900 psi (41 MPa)	280 ksi (1900 MPa)	3.7 ft-lb/in (196 J/m)	9 ft-lb/in (481 J/m)	96° C
PC	4.8%	9,800 psi (68 MPa)	324 ksi (2200 MPa)	1.0 ft-lb/in (53 J/m)	6 ft-lb/in (320 J/m)	127° C
ULTEM 9085	5.9%	10,390psi (72 MPa)	322 ksi (2200 MPa)	2.0 ft-lb/in (106 J/m)	11.5 ft-lb/in (614 J/m)	153° C
PPSF	3%	8,000 psi (55 MPa)	320 ksi (2200 MPa)	1.1 ft-lb/in (59 J/m)	3.1 ft-lb/in (165.5 J/m)	189° C

* HDT after annealing part at 140° C for 2hrs

FDM Nylon vs. SLS/LS Material Comparison



Technology Material	Elongation @ Break	Tensile Strength	Flexural Modulus	Izod Impact		HDT @264 psi (Heat Def. Temp)
				Notched	Unnotched	
Stratasys FDM Nylon 12	30%+	7000 psi (48 MPa)	190 ksi (1310 MPa)	3.17 ft-lb/in (200 J/m)	>37.4 ft-lb/in (>2000 J/m)	82° C*
3D Systems Duraform PA	14%	6237 psi (43 MPa)	201 ksi (1387 MPa)	0.6 ft-lb/in (32 J/m)	6.3 ft-lb/in (336 J/m)	95° C
EOS PA 2201	15%	7000 psi (48 MPa)	217.5 ksi (1500 MPa)	0.78 ft-lb/in (40 J/m)	8.6 ft-lb/in (460 J/m)	75° C


* HDT after annealing part at 140 ° C for 2hrs


Toughness, Strength, and Flexibility

- Highest tensile strength
- Highest unnotched impact resistance
- Best elongation at break and flex modulus

Lower flex modulus = more flexible

FDM vs. SLS/LS Nylon 12

Material Properties 	Mechanical Properties	Thermal Resistance	Part Aesthetics	Chemical Resistance
FDM Nylon 12	+	+		+
SLS Nylon 12		+	+	+

Build Process 	Cost per part	Total cost of ownership	Total process time	Ease of use	Size of parts
FDM Nylon 12	+ Low-Med Volume	+	+ Low-Med Volume	+	+
SLS/LS Nylon 12	+ Med-High Volume		+ Med-High Volume		

Significant advantage in mechanical properties and build process

FDM Nylon 12

Material Best Practices

Building with Nylon 12

Nylon 12 Users Guide

- **Semi-crystalline material:** Enables annealing to improve temperature resistance
- **Build Modes:** Can optimize part performance by adjusting the oven temperature based on the part geometry
- **Support Removal:** Soluble support (SR-110) with tank temperature determined by geometry
- **Post Processing:** Mass finishing compatible, machine able, bonds well, and accepts inserts well.

Build Mode Selection

Build Modes

- User selects build mode in Insight while processing part
- Geometry specific build modes enable optimization of part quality and mechanical properties
- Software automatically adjusts the oven temperature to control the crystallization rate and reduce internal stresses

Build Mode	Dimension (thickest wall)	Oven Temp (° C/° F)
Thin Wall	<2.5 mm	80/176
Normal	2.5 mm – 12.7 mm	100/212
Brick	>12.7 mm	120/248

Choose build mode based on the thickest section of the part. For parts with a wide variation in wall thicknesses you can choose Brick mode and build the part at an angle to improve part accuracy.

Support Removal

Support Removal

- New support material SR-110. Uses T12 SR-100 series tips.
- Due to temperature sensitivity of parts the support removal bath needs to be set to a lower temperature
- Thicker parts can have support removal at higher temperatures to accelerate the process

Build Mode	Dimension (thickest wall)	Support Removal Tank Temp (° C)
Thin Wall	<2.5 mm	50
Normal	2.5 mm – 12.7 mm	60
Brick	>12.7 mm	70

Most parts will have support completely removed when tanked at 50° C over night (8-12 hours).

Annealing capability

Annealing

- Significantly increases Heat Deflection Temperature (55° C → 82° C)
- If annealing: shrink factor should be changed to 1.0251 for X and Y
- Only necessary for applications that will see ~50° C+ temperatures

Build Mode	Dimension (thickest wall)	Annealing Temp (° C/° F)	Annealing Time in Oven (min)
Thin Wall	<2.5 mm	130/266	300
Normal	2.5 mm – 12.7 mm	135/275	180
Brick	>12.7 mm	143/290	60

To ensure proper annealing leave the part in an oven at the recommended temperature for the recommended time.

Nylon 12: First FDM material that can be annealed

Key Application Capabilities

Snap fits & clips

Covers, panels, facades
Housings, enclosures, clamps



Fatigue resistance / high endurance parts

Ducts
Repetitive vibration, flex, stress



Tooling / prototypes w friction-fit inserts

Drill guides, bushings, wear surfaces
Threaded inserts



Target Applications

- **Functional prototypes:**
Very high mechanical, and fatigue and moderate chemical resistance.
- **Jigs/Fixtures and Tooling/Patterns:**
High durability and dimensional stability. Easy machining (drilling, tapping, friction fit inserts, etc.). High impact strength / resistance.
- **End use parts:**
For aerospace, automotive, and other high-requirements industries
- **Unique Material to FDM:**
Current customers may not readily identify applications due to the unique properties of Nylon 12



Target Customer Profile

Fortus System Owner / SLS System Owner using Nylon 12/11:

- Large engineering companies & service bureaus
- Capacity constrained on SLS



\$200M
SLS Nylon Parts
Market

Fortus System Owner / SLS Nylon 12/11 Part Buyer:

- Have not justified large SLS system investment
- FDM capacity available or needs aid to justify adding capacity

Previous Fortus System Prospect / SLS Nylon 12/11 Part Buyer:

- Have not justified large SLS system investment
- Added FDM capabilities aid to justify Fortus purchase

Nylon 12 Launch

Euromold 2013

- December 3rd, Frankfurt
- Nylon will be featured at the Stratasys exhibit



Pricing

- Material priced the same as PC and PC-ABS
- Material Option – same as PC and PC-ABS



Nylon 12 Launch



Part number

310-21800	Nylon 12 Filament Canister, Fortus 360/400/900mc, 92 in ³ (1510 cc)
310-32200	SR-110 Soluble Release Support Canister, 92 in ³ (1510 cc) - Fortus eV/eT/360/400/900mc (Nylon 12, Nylon 12 CFR)
325-11050	Nylon 12 Model with SR-110 Soluble Support Material Package for Fortus 900mc - Two (2) Nylon 12 Model Material Canisters - Two (2) SR-110 Soluble Support Material Canisters - One (1) Package of Small Nylon Build Sheets (qty 20) - One (1) Package of Large Nylon Build Sheets (qty 10) - One (1) T16 Tip Set (T16/T16) - One (1) T12 Tip Set (T12/T12)
311-11050	Nylon 12 Model with SR-110 Soluble Support Material Package for Fortus 360/400mc - Two (2) Nylon 12 Model Material Canisters - Two (2) SR-100 Soluble Support Material Canisters - One (1) Package of Nylon Build Sheets (qty 20) - One (1) T16 Tip Set (T16/T16) - One (1) T12 Tip Set (T12/T12)
125-21500	Nylon 12 Model with SR-110 Soluble Support Material Option, Fortus 900mc - allows Fortus 900mc to run Nylon 12 material - includes 3 Nylon 12 Material Packages (PN: 325-11050)
161-21500	Nylon 12 Model with SR-110 Soluble Support Material Option, Fortus 400mc - allows Fortus 400mc to run Nylon 12 material - includes 2 Nylon 12 with Nylon 12 Material Packages (PN: 311-11050)
162-21500	Nylon 12 Model with SR-110 Soluble Support Material Option, Fortus 360mc - allows Fortus 360mc to run Nylon 12 material - includes 2 Nylon 12 Material Packages (PN: 311-11050)
310-00400	Foundation Sheet (pkg of 20) - Fortus 360/400mc (Nylon 12)
325-00500	Foundation Sheet - Small (pkg of 20) - Fortus 900mc (Nylon 12)
325-00600	Foundation Sheet - Large (pkg of 10) - Fortus 900mc (Nylon 12)

Nylon 12 Launch

Nylon12 Collaterals:

New

- Nylon12 Launch presentation
- Nylon12 material data sheet
- About Nylon12
- Nylon12 Frequently Asked Questions
- Nylon12 and SR110 MSDS
- Nylon12 Images

Updated

- Production series Brochure
- Fortus Systems & Materials
- Fortus 360mc Brochure
- Fortus 400mc Brochure
- Fortus 900mc Brochure



From tomorrow
Available for download

Summary

Stratasys now has Nylon!

- Nylons: widely used in traditional and additive manufacturing
- Now available with the convenience & affordability FDM
- Toughest Nylon 12 AM parts on the market
- Nylon 12 is the first in a family of Nylons

FDM Nylon 12 differentiators

- Exceptional fatigue resistance
- Toughest Nylon 12 in additive manufacturing
 - 2x the elongation at break vs. SLS
 - Best impact strength
 - Highest z-strength ratio FDM material
- Good chemical resistance



FDM Nylon 12

Appendix

FDM Nylon 12 Datasheet

CONDITIONED*			
Mechanical Properties ¹	Test Method	English	Metric
Tensile Strength (Type 1, 0.125", 0.2"/min)	ASTM D638	7,000 psi	48.26 MPa
Tensile Modulus (Type 1, 0.125", 0.2"/min)	ASTM D638	190 ksi	1,310.03 MPa
Elongation at Break (Type 1, 0.125", 0.2"/min)	ASTM D638	30%	30%
Elongation at Yield (Type 1, 0.125", 0.2"/min)	ASTM D638	6.5%	6.5%
Flexural Strength (Method 1, 0.05"/min)	ASTM D790	10,000 psi	68.95 Mpa
Flexural Modulus (Method 1, 0.05"/min)	ASTM D790	190 ksi	1,310 Mpa
Flexural Strain at Break	ASTM D790	No Break	No Break
IZOD impact - notched (Method A, 23°C)	ASTM D256	3.74 ft-lb/in	200 J/m
IZOD impact - unnotched (Method A, 23°C)	ASTM D256	>37.4 ft-lb/in	>2,000 J/m

UNCONDITIONED (DRY)**			
Mechanical Properties ¹	Test Method	English	Metric
Tensile Strength (Type 1, 0.125", 0.2"/min)	ASTM D638	7,700 psi	53 MPa
Tensile Modulus (Type 1, 0.125", 0.2"/min)	ASTM D638	190 ksi	1,310 MPa
Elongation at Break (Type 1, 0.125", 0.2"/min)	ASTM D638	9.5%	9.5%
Elongation at Yield (Type 1, 0.125", 0.2"/min)	ASTM D638	6.5%	6.5%
Flexural Strength (Method 1, 0.05"/min)	ASTM D790	10,200 psi	70 Mpa
Flexural Modulus (Method 1, 0.05"/min)	ASTM D790	190 ksi	1,310 Mpa
Flexural Strain at Break	ASTM D790	No Break	No Break
IZOD impact - notched (Method A, 23°C)	ASTM D256	2.8 ft-lb/in	150 J/m
IZOD impact - unnotched (Method A, 23°C)	ASTM D256	>37.4 ft-lb/in	>2,000 J/m

*Conditioned = Test specimens are conditioned according to procedure A of ASTM D618 (40 hours @ 23C and 50% relative humidity)

**Unconditioned (Dry) = As printed (No soluble support removal)

FDM Nylon 12 Datasheet



Thermal Properties ²	Test Method	English	Metric
Heat Deflection (HDT) @ 66 psi annealed	ASTM D648	206.6°F	97°C
Heat Deflection (HDT) @ 66 psi unannealed	ASTM D649	167°F	75°C
Heat Deflection (HDT) @ 264 psi annealed	ASTM D650	179.6°F	82°C
Heat Deflection (HDT) @ 264 psi unannealed	ASTM D651	131°F	55°C
Melting Point	-----	352.4°F	178°C

Material Comparison

Technology Material	Nylon	Elongation @ Break	Tensile Strength	Flexural Modulus	Izod Impact		HDT	
					Notched	Unnotched	@66 psi	@264 psi
FDM Nylon 12	12	30%+	7000 psi (48 MPa)	190 ksi (1310 MPa)	3.17 ft-lb/in (200 J/m)	>37.4 ft-lb/in (>2000 J/m)	97° C*	82° C*
Solid Concepts Nylon 12	12	15%	6815 psi (46 MPa)	188.5 ksi (1300 MPa)	4.12 ft-lb/in (220 J/m)	>8.24 ft-lb/in (440 J/m)	177° C	86° C
Solid Concepts Nylon 11	11	21%	6817 psi (45 MPa)	126 ksi (1647 MPa)	1.3 ft-lb/in (70 J/m)	26 ft-lb/in (1370 J/m)	157° C	50° C
EOS PA 1101	11	45%	7000 psi (48 MPa)	N/A	Charpy (70 J/m)	N/A	159° C	55° C
EOS PA 2200 (performance)	12	20%	7250 psi (50 MPa)	217.5 ksi (1500 MPa)	0.78 ft-lb/in (40 J/m)	N/A	N/A	N/A
EOS PA 2201	12	15%	7000 psi (48 MPa)	217.5 ksi (1500 MPa)	0.78 ft-lb/in (40 J/m)	8.6 ft-lb/in (460 J/m)	154° C	75° C
3D Systems Duraform PA	12	14%	6237 psi (43 MPa)	201 ksi (1387 MPa)	0.6 ft-lb/in (32 J/m)	6.3 ft-lb/in (336 J/m)	203° C	95° C

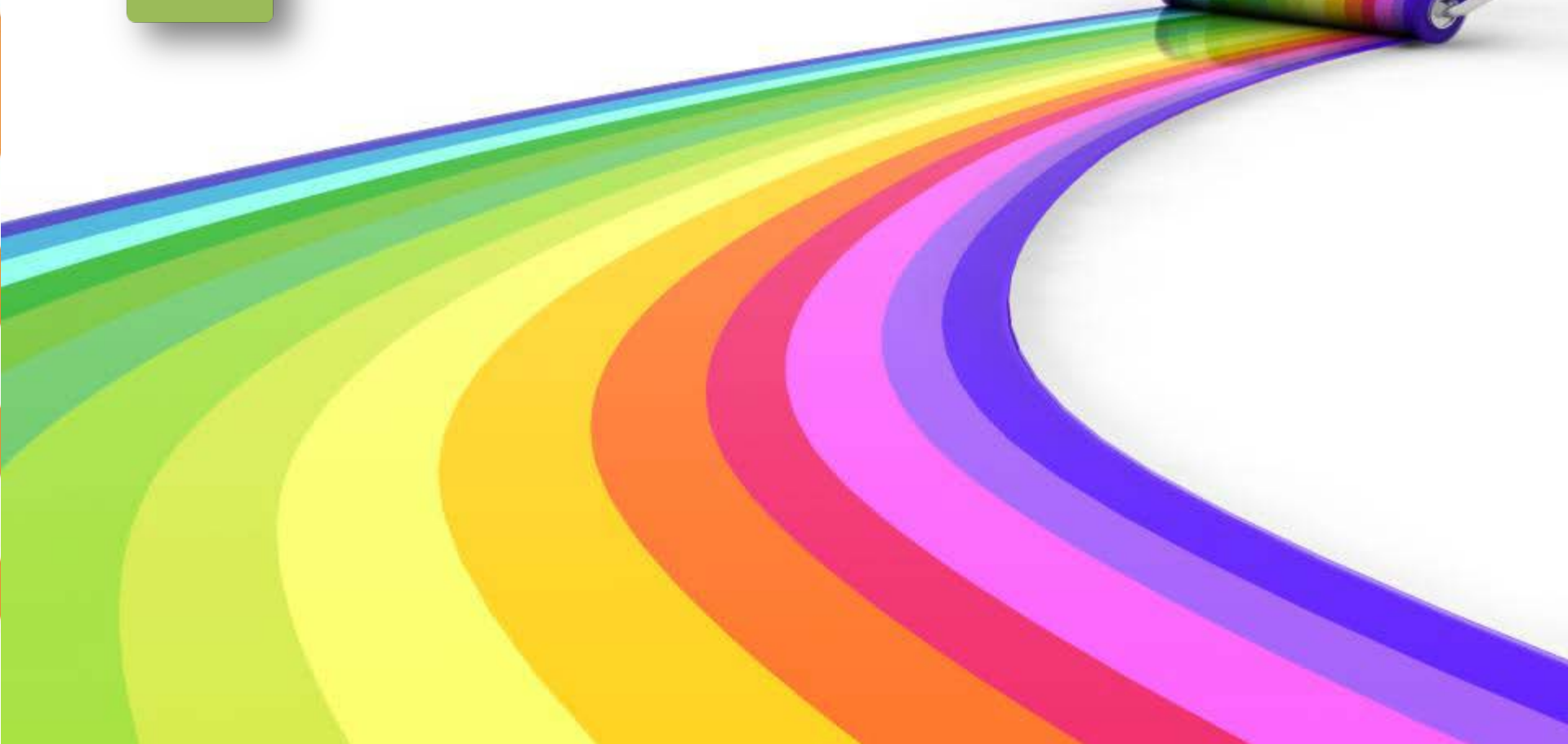
EOS PA 1101 – 48 MPa Z-strength

EOS PA 2202 – 48 MPa Z-strength

* HDT after annealing part at 140° C for 2hrs

2

Design
series



Objet500 Connex3 介绍



Objet500 Connex3 简介

**全球首款彩色多材料
3D 打印机**

Objet500 Connex3



可同时喷出 3 种材料

可打印数字 ABS 材料
(绿色和象牙色)

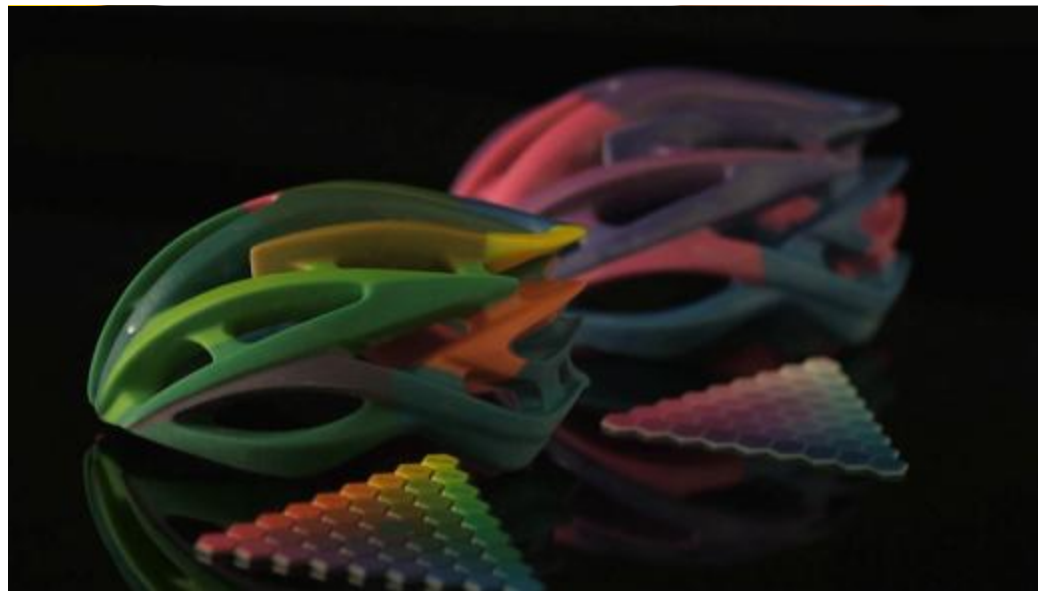
结合数字 ABS 和 15 种现有材料 (墨盒材料)

- 应用灵活
- 透明包覆成型

基于 Vero Magenta /
Vero Cyan / Vero Yellow
的新颜色材料

每次打印提供多达 46 种颜色选择

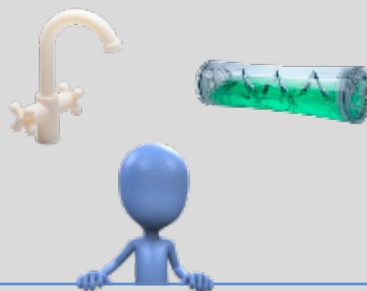
Objet500 Connex3



光敏聚合物

刚性材料

- 通用半透明
- 类聚丙烯
- 耐高温
- 仿 ABS数字材料
- 透明



柔性、橡胶类材料

- 高伸长率
- 多种肖氏硬度 A 值（硬度）
- 较强的抗撕裂性



医疗行业

- 与助听器有良好的生物相容性
- 生物相容的透明材料
- 牙科产品



数字复合材料

- Pre-defined Digital Materials™



最真实的产品效果

在产品开发阶段提前打印出与最终产品媲美的模型

- 目前3D打印行业对于鲜明色彩的唯一解决方案
- 在一个打印模型上打印出不同材质效果
- 带来高精度，更光滑，细节更好地模型
- 降低后处理的时间与投入 (不需要上色和组装)

无与伦比的多样性

针对设计的不同阶段提供广泛模型解决方案的多功能打印机

- 专注于提供贯穿整个设计周期的大量快速原型，从概念模型到设计确认 (外观，装配以及功能)
- 所有原型需求最广泛行业的模型应用



“让我们的原型部件拥有生产零件的
外观和触感，这至关重要”

Mike Zeigle, Trek



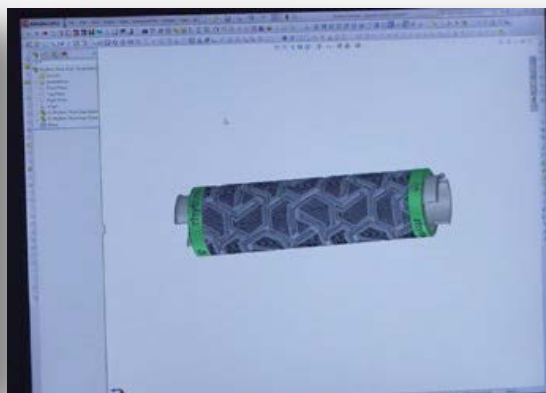
Trek Bicycle（崔克自行车）成功案例



• 最接近实际产品的头盔模型（左图）



车座实际压力模型的展示（右图）



“原型部件与生产件的外观和触感需要非常类似，这一点十分重要”。
“为了制造出最好的自行车，Trek 需要最棒的工具，而 Connex3 就是我们的最佳选择。”

— Mike Zeigle, Trek

快速成型 (Rapid Prototyping)



ABS数字材料 - 全新的包覆成型技术



- ABS数字材料满足高韧性应用需求 (Digital ABS material for high toughness applications)
- ABS数字材料可以与以下材料相结合：
 - 肖式硬度 A 范围内的橡胶类材料
 - 透明材料
 - 有色材料 - 不透明 (单色)
- 还有其他 12 种数字 ABS 象牙色柔性数字材料可供选择
 - 结合 Tango+/TangoBlack+材料
 - 涵盖不同的肖式硬度 A 值 (肖式硬度 A27-A95)



目标市场

核心垂直市场



消费品/运动商品



教育



消费类电子



娱乐



玩具



汽车

目标客户

- 原始设备生产商
- 设计工作室
- 服务机构

汽车 - 市场需求

- 坚固耐用的材料
- 零件的“外观”、“配合和装配”以及功能和重复性测试
- 出色的尺寸稳定性
- 柔软触感功能
- 部分零件具有柔软触感

汽车 - Connex3 最佳配合

- D-ABS 与橡胶的完美结合可以实现：
 - 用于功能测试的出众韧性和稳定性，一次打印即可融合不同的肖氏硬度 A 值
 - 零件美观并具有卓越的稳定性
- D-ABS 与透明橡胶完美结合，实现“功能性”零件的闪电应用



消费品：鞋子原型



新款鞋子的快速成型制作案例。

体育用品 - 市场需求

- 从单色（配件）到全色需求。
- 高韧性零件（自行车零件）
- 柔性零件（鞋底，配件）
- 透明度（鞋底、自行车 LED 车灯）
- 由于每个零件都需进行多次迭代，因此打印时间至关重要。
- 精致细节与出众的表面质量

体育用品 - Connex3 最佳配合

- 提供鲜艳的深色颜色和优于替代选择的精细分辨率。
- D-ABS 适用于高韧性应用，现具备橡胶/有色材料。
- 柔性色彩 - 特有功能，适用于鞋底和体育用品配件。
- 透明色 - 独特选择
- 精致细节与出众的表面质量。



日用品- 市场需求

- 每个零件通常多达 5 种颜色
- 出众的表面质量
- 细节精致的零件
- 可满足配合/装配需求的韧性
- 橡胶材料贴近最终产品实物



日用品- Connex3 最佳配合

- 调色板中的颜色空间满足您对颜色相似度的需求（无精确的潘通色卡）
- 兼具出众的表面质量与精致的细节功能。
- Vero 颜色韧性满足配合/装配需求
- 类橡胶与彩色零件的完美结合，为您带来最逼真的最终产品实物
- 能够打印各种色泽光亮的刷毛，性能无与伦比

包装 - 市场需求

- 零件的韧性
- 透明及半透明颜色
- 精确的潘通色卡不是主要需求
- 出众的表面质量
- 橡胶颜色



包装 - Connex3 最佳配合

- 含类橡胶涂层和数字材料的 D-ABS 以无与伦比的韧性缔造出具有精美外观和极致触感的最终零件。
- 象牙色 ABS - 白色应用的最佳解决方案
- 各种透明度的半透明颜色 - Connex3 特有功能
- 刚性材料与橡胶的完美结合 - 缔造最逼真的最终产品实物

眼镜 - 市场需求

- 镜片透明度
- 尺寸稳定性
- 精确的潘通色卡不是主要需求
- 出众的表面质量
- 活动零件具有足够的韧性

眼镜 - Connex3 最佳配合

- 各种透明度的半透明镜片颜色 – Connex3 特有
- 刚性彩色镜框具有出众的尺寸稳定性
- 在保持镜框最佳“外观与触感”的同时，如果对柔韧性有更高的要求，请使用 D-ABS 和 TangoB+



手机 - 市场需求

- 薄壁零件
- 满足“配合和装配”测试所必需的韧性
- 出众的表面质量
- 从基色到全色

手机 - Connex3 最佳配合

- 最终零件拥有精美的外观和极致触感，兼具出众的表面质量与颜色
- 满足彩色“配合和装配”的韧性需求
- 每个零件有多达 45 种颜色
- 不同肖氏硬度 A 值的颜色，Connex3 特有功能（例如：手机外壳）

设备 - 市场需求

- 可满足“配合和装配”需求的韧性（电器零件的包装）
- 薄型零件和精致细节（PC板）
- 出众的表面质量和基本颜色功能（电子设备）
- 足够的热稳定性

设备 - Connex3 最佳配合

- 材料用途广泛，满足各种需求：
 - 适用于卡扣配合应用的 D-ABS
 - 需要更高稳定性时的 D-ABS
 - 含橡胶的 D-ABS - 适用于外壳含橡胶的“功能性”零件
 - 不同肖氏硬度 A 值的 Vero 颜色和柔性颜色 - 缔造设备的精美外观和极致触感



娱乐 - 市场需求

- 某些情况下，零件会用作耗能产品：
 - 细节精致的零件
 - 零件精确度高
 - 出众的表面质量
 - 从基色到全色
- 根据市场需求使用零件：
 - 材料用途广泛
 - 类橡胶 -> 柔性 -> 刚性
 - 从基色到全色

娱乐 - Connex3 最佳配合

- 模型用作耗能产品：
 - 出众的精确度与 Z-Corp
 - 无与伦比的表面质量
 - 鲜明色彩与 Z-Corp
- 根据市场需求使用零件：
 - 无与伦比的材料通用性 - 从橡胶到刚性橡胶/刚性彩色零件，D-ABS 以及透明材料
 - 绚丽色彩满足各种市场需求

教育 - 市场需求

- 一次打印即可完成功能模型的复杂机械结构
- 材料用途非常广泛，每个零件均可使用多种材料进行打印
- 出众的精确度与精致细节



教育 - Connex3 最佳配合

- 功能性零件采用 D-ABS 与类橡胶材料制成，兼具减震/抗冲击/动态摩擦作用
- 无与伦比的材料通用性。多达 1000 种材料，打造各种精美外观和超强性能。
- 柔性色彩使外观和触感更加贴近所需零件





儿童医院用3D 打印的患者心脏的复制品，用于辅助心脏外科医生的复杂手术。
(CLEM MURRAY / Staff Photographer)



Cardiologist Yoav Dori with printed models. "The malformations that we deal with are incredibly complex," he says.



“彩色3D模型为复杂的心脏外科手术提供了绝佳减少犯错误的手段，”

Yoav Dori 说。

医疗设备 - 市场需求

- 各种应用（植入假体、诊断设备、外科器械...）
- 用于功能测试和卡扣配合应用的高韧性材料
- 精致的细节功能与高精度度
- 透明度（试管等）
- 流体流动分析
- 人体工学评估



医疗设备 - Connex3 最佳配合

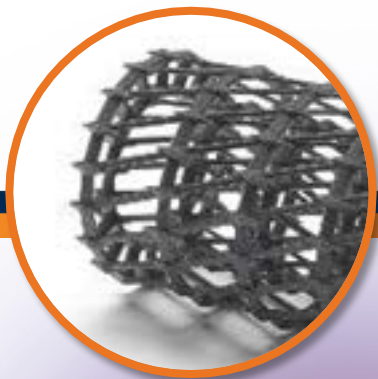
- 对于需要进行功能测试的 D-ABS，现在只需一次打印即可拥有透明度/橡胶
- 刚性材料具有良好的透明性，类橡胶则具有良好的半透明性
- 无与伦比的材料通用性，从不同部件的有色材料到用于管子的橡胶材料 - 一次打印即可实现更多精彩
- 将电子产品插入半透明模型



亮点总结



打造精致细节



混合部件和托盘



尺寸精准、
表面光滑



高韧性、包覆成型
技术



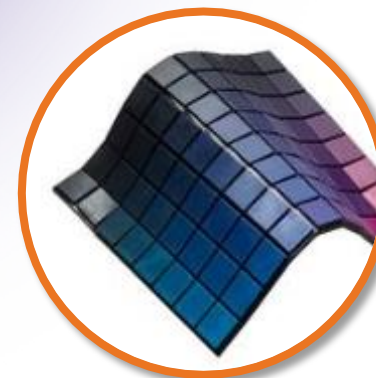
彩色不透明材料



彩色半透明材料



彩色柔性材料



谢谢

谢谢