



StratasyS 3D 프린터 소개

시스템 엔지니어링



SysOpt



StratasyS
FOR A 3D WORLD™

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회사 소개



(주)시스옵엔지니어링

Sysopt Engineering Co., Ltd.



SysOpt

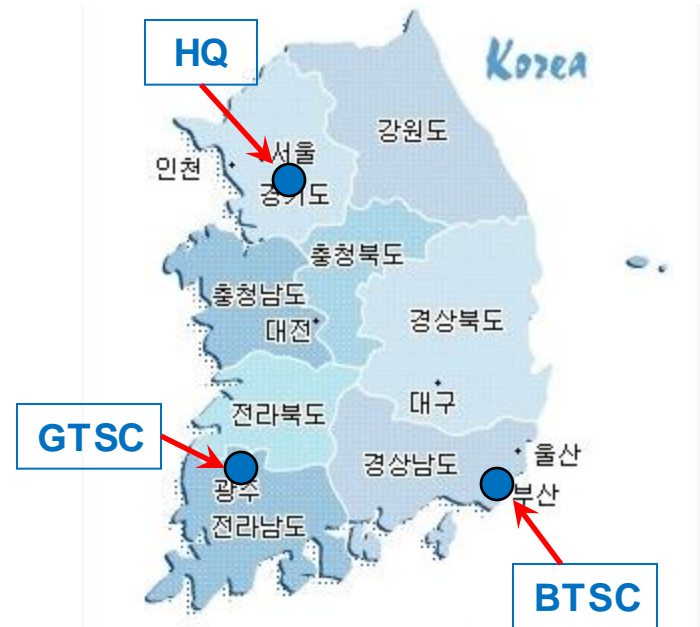
(주)시스옵엔지니어링 개요

설립 : 1996년

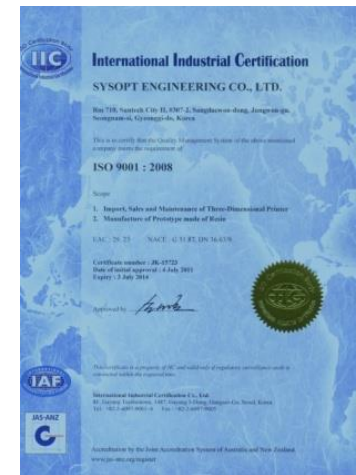
인원 : 총 18명

매출 : 약 50억원 (2012년)

- 본사 : 경기도 성남시 상대원동
- 전화 : 031-737-4730 팩스 : 031-737-4734
- 부산기술지원센터 : 부산시 남구 문현동
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- 홈페이지 : www.sysopt.co.kr



(주)시스옵엔지니어링 연혁



- 1996. 09. 회사 설립 - 강남구 역삼동
- 10. LG EDS와 UG 대리점 계약 – CAD/CAM 사업
- 2002. 11. **이스라엘 Objet Geometries사와 3D Printer Distributor 계약**
- 2003. 09. 분당테크노파크로 확장 이전
- 2004. 05. Materialise사와 Magics 대리점 계약
- 2005. 09. 성남산업단지 선택시티 2차로 사옥마련 이전
- 2010. 04. **'2009 Objet Best Customer Support'상 수상**
- 2011. 02. **'2010 Objet Best Customer Satisfaction'상 수상**
- 2011. 07. ISO 9001 인증 취득
- 2011. 12. 기업부설연구소 설립
- 2012. 05. **'2011 Objet Best Distributor'상 수상**
- 2012. 12. Stratasys와 Objet 합병
- 2013. 04. Stratasys사 FDM Product 국내 판매 개시

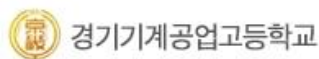
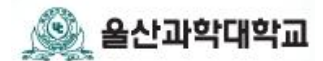
(주)시스옵엔지니어링 **고객** - 일반기업



(주)시스옵엔지니어링 **고객** - 공공기관 등



(주)시스옵엔지니어링 **고객** - 교육기관



Stratasys Ltd. - The Leader in 3D Printing



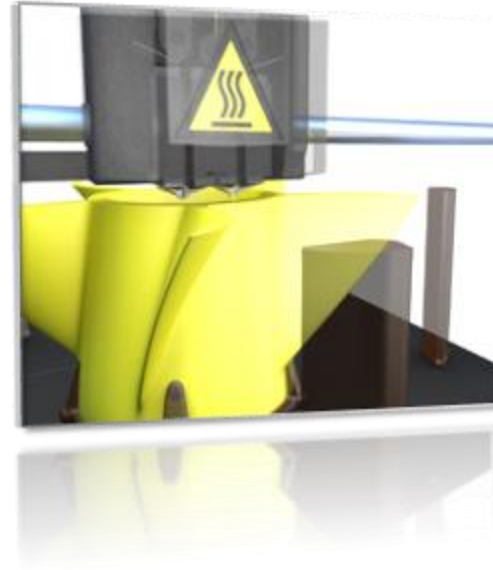


- Headquarter : 미국 Minnesota / 이스라엘 Rehovot
- Workforces : over 1000 employees
- Global partner Network : over 260 resellers and agents
- Revenue (2011) : \$277M
- **Patents : 500** granted or pending additive manufacturing patents globally
- Awards : 20 technology & leadership awards
- Installation Base : ~ **30,000** units installed worldwide
- Three complementary technology platforms (InkJet, FDM, Solidscape)

Over 30,000 3D Printers installed WW... **SysOpt** **Stratasys** FOR A 3D WORLD™

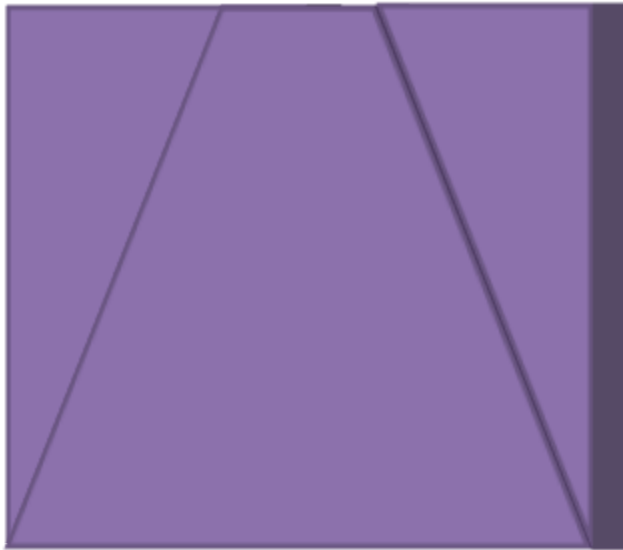


Stratasys 3D Printing Technology

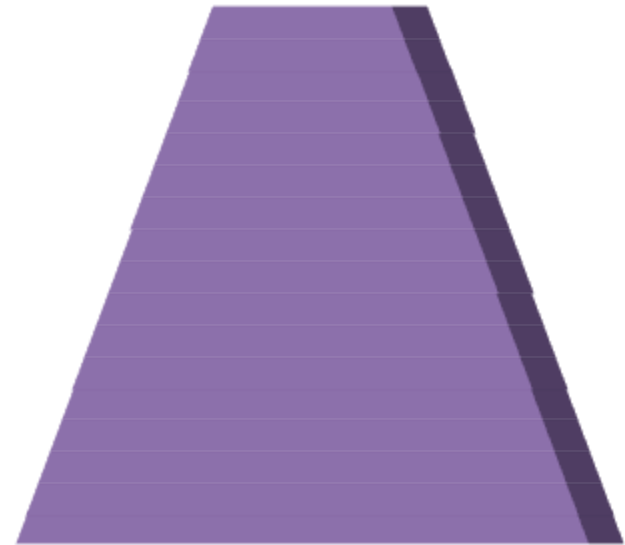


3D Printing 개요

3D Printing 은 additive manufacturing 적용



Subtractive Manufacturing



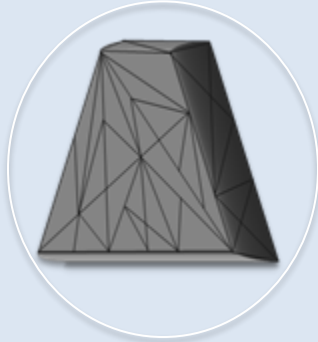
Additive Manufacturing

The 3D Printing Process



3D CAD file

- 3D CAD SW
- Made by designer



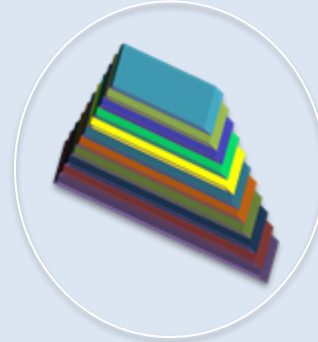
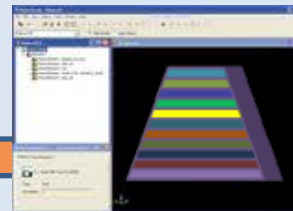
STL File

- 3D CAD SW
- "Save As" STL



Slicing of STL

- SW Sliced to layers



Printing

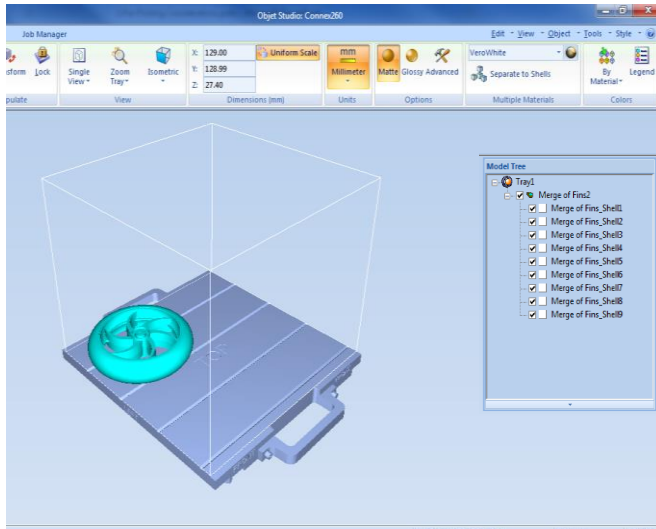
- 3d printer
- Layer upon layer



사용 Software

- Polyjet

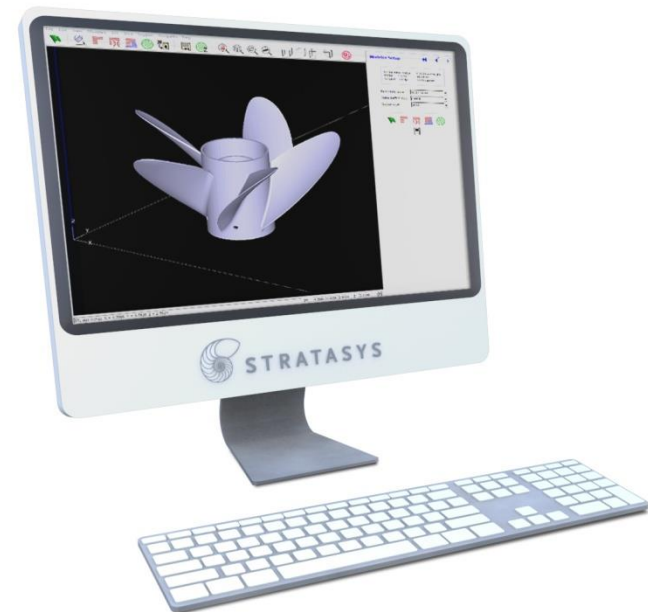
- Objet Studio
- 모든 프린터가 같은 SW 사용



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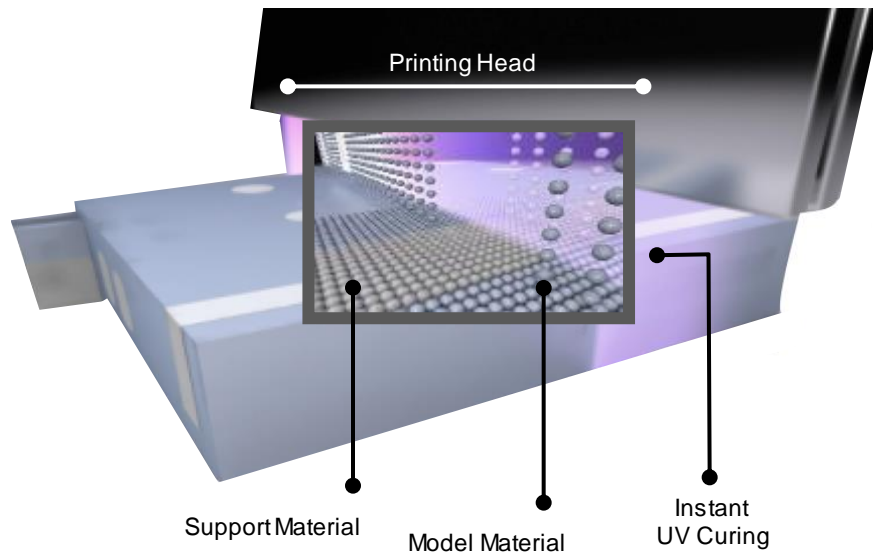
- FDM

- Mojo - Mojo Print Wizard
- uPrint & Dimension - CatalystEX
- Fortus - Insight

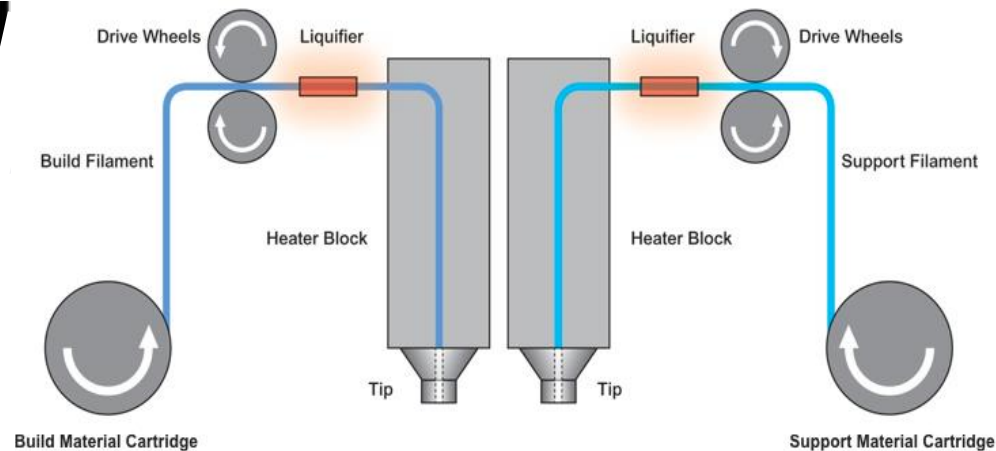


Polyjet & FDM Technologies

Polyjet



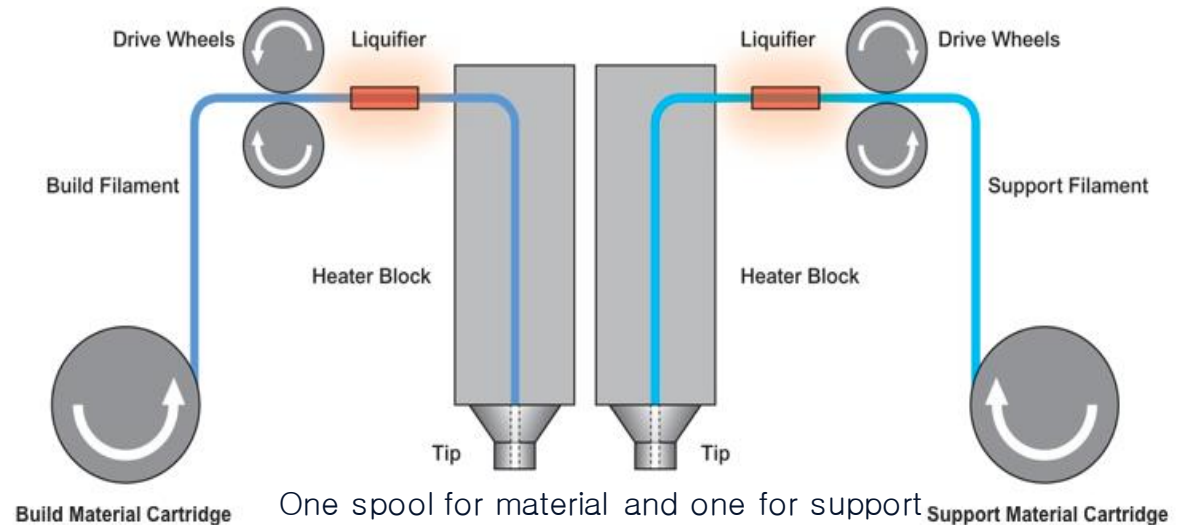
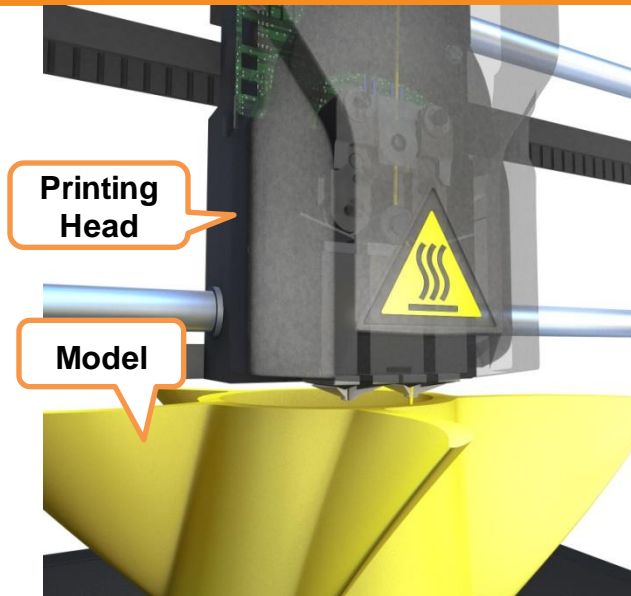
FDM



- 123 종류의 다양한 재료
- Multi-material 사용 가능
- 높은 해상도와 정밀한 표현

- Real thermoplastics
- 높은 정밀도(Accuracy)
- 높은 내구성(Durability)

FDM Technology



- Filamen(재료)에 열을 가하여 액상 상태로 만들어 노즐(nozzle)을 통해 내보내며 원하는 형상을 그림("Draws")
 - 벡터 기반 기술 – 선형(Linear)
 - 외형/경계(contour / boundaries) 에서 drawing을 시작하여 안쪽을 채움
- 재료는 냉각되면서 경화됨.
- Extrusion Nozzle - X & Y 축으로 동작 / Build platform 이 Z 축으로 동작

Stratasys Products



Next Industrial Revolution

3D 프린터를 통해 개인 / 팀 / 조직의 업무 혁신 가능!



디자이너의 Idea를
쉽게 형상화함.



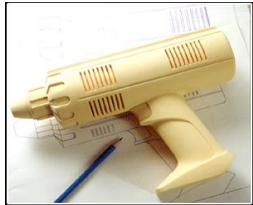
신제품 디자인을 쉽게
다듬고 개선.



신제품이 생산되는
방식을 혁신적으로 변경.

Product families

Conceptual Models



**Idea
series**

Design Prototypes



**Design
series**

Production Parts



**Production
series**

Our Products

1

Idea
series



2

Design
series



3

Production
series



SysOpt

The Idea Series



It's not just a 3D printer, it's an idea engine.

For Concept Modeling



- Enhanced creativity & design flexibility를 위한 제품
- Designers 및 engineers 개인별로 사용하기 편리함.

The Design Series

The Design Series

The power of prototyping. Maximized.

**For Precision
Fit and Form**

**For Performance
Fit and Function**



- 효과적인 제품 개발 Cycle 단축을 위한 최고 품질의 Prototype 제작
- 높은 생산성을 가지며 다양한 재료로 완벽한 제품 표현 가능.
- Fit, form and function 평가 및 ergonomic studies 등에 이상적임.

The Production Series

Production. Without the line.

For Direct Digital Manufacturing



- 완제품에 적용할 수 있는 Repeatability, cost-effective parts 사용
- 빠르고 정밀한 시제품 제작
- 빠르고 저비용으로 생산 제품 변경 및 다양한 제품 생산 가능
- 산업 표준의 thermoplastics
- Customization & short run parts 제작

Our Products

1

Idea
series



SysOpt

Idea Series – Mojo & uPrint

Idea
series

- Mojo : Idea Engine! 단순하며 사용하기 편리함. 사무실 내에 설치!
- uPrint SE & SE Plus : Form / Fit / Function Evaluation을 사무실에서 간단하게!
- 제품 Pack 포함 사항
 - Model & Support Material
 - Modeling Bases
 - Support Cleaning System
 - EcoWorks – support cleaning agent



	Layer Thickness	Sparse	Network Connectivity	Build size [mm]	Model	Support
Mojo	0.007" 0.178mm	No	No	5"x 5"x 5" [127x127x127]	ABSplus (Ivory)	Water soluble WaveWash 55
uPrint SE	0.010" 0.254mm	Yes	Yes	8"x 6"x 6" [203x152x152]	ABSplus (Ivory)	Water soluble WaveWash
uPrint SE Plus	0.010"-0.013" 0.254-0.330mm	Yes	Yes	8"x 8"x 6" [203x203x152]	ABSplus 9 colors	

Our Products

2

Design series



Design Series : Precision Design & Performance Design

1. Polyjet은 더욱 정밀하고 섬세한 모델 조형에 적합.
2. FDM 은 조형된 모델로 성능/기능 테스트 수행 시에 적합.

Precision Prototyping

Print realistic models for wide range
of fit, form & Function applications

**SysOpt**

Performance Prototyping

Fit & high performance
Function Testing



Objet 1000



Design
series



Stratasys Objet1000

Big Models. Ultimate Precision

SysOpt

Big Prototypes with Flawless Precision

Design
series

- 대형 Scale의 Rapid Prototyping
 - 조형 사이즈 : 1000 (x) X 800 (y) X 500 (z) [mm]
- High Quality Printing
 - 16 / 30 micron Layers
 - 해상도(Resolution) : 600 x 600 x 1600 dpi
- 다양한 모델 재료
 - 연질 / 경질 / 투명 / 불투명 재료
- Connex 복합재료 3D printing 기술 적용
 - Digital Materials 사용
 - Digital ABS Material 사용
 - 한번 조형에 14가지 Materials 사용



Design - Performance Prototyping

- 3 Printers

Design
series



Dimension 1200es BST



Dimension Elite



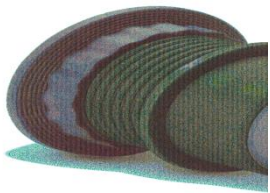
Dimension 1200es SST

Dimension Line

Design
series

- 주요 사양

	Process	Build size [mm]	Model materials	Layer Thickness	Soluble Support Material
Dimension 1200es BST	FDM	10" x 10" x 12" [254 x 254 x 305]	ABSplus (9 Colors)	0.010"-0.013" 0.254-0.330mm	No - Breakaway
Dimension 1200es SST	FDM	10" x 10" x 12" [254 x 254 x 305]		0.010"-0.013" 0.254-0.330mm	Yes
Dimension elite	FDM	8" x 8" x 12" [203 x 203 x 305]		0.007"-0.010" 0.178-0.254mm	Yes



SysOpt



Our Products

3

Production
series



Production Series

FORTUS® 3D PRODUCTION SYSTEMS

Production
series

FORTUS 250mc



FORTUS 360mc



FORTUS 400mc



FORTUS 900mc



Performance

- 조형 Size
- Materials
- 정밀도(Accuracy)
- 해상도(Resolution)
- Flexibility
- Supports

SysOpt

Why FORTUS?

Production
series



다양한 내구성 높은 thermoplastics

큰 조형 size

빠른 속도 (Throughput)

정밀도 / 안정성

낮은 유지관리비

Facility friendly

손쉬운 사용

FORTUS – 재료(materials)

Production
series

Material	Characteristic
ABS-M30	Versatile material
ABS-ESD7	정전기 방지(Static dissipative)
ABS-M30i	Biocompatible (ISO-10993)
ABSi	Translucent
PC-ABS	High Impact Strength
Polycarbonate	High Tensile Strength
PC-ISO	Biocompatible (ISO-10993)
ULTEM 9085	FST* Certification, High Mechanical
PPSF/PPU	Thermal and Chemical Resistance
Soluble Supports**	<i>**Not a thermoplastic, alternate usage</i>



FORTUS 250mc

Production
series

- Build Envelope [mm]: 254 x 254 x 305
- ABSplus-P430 material
 - 다양한 색상 선택
 - SR-30 soluble supports
- Layer Thickness (SW Controlled):
 - 0.178mm, 0.254mm, 0.330mm
- Insight pre-processing S/W 사용
- Accuracy : ± 0.0095 inch ($\pm .241$ mm)



FORTUS 360mc

Base System

- Build Envelope (MM): **355 X 254 X 254**
- One Build & Support Canister Bay

Upgraded System

- Build Envelope (MM): **406 X 355 X 406**
- Two Build & Support Canister Bays
- 3가지 모델 재료 선택 가능
 - ABS-M30 / PC / PC-ABS
 - Layer Thickness (Material Dependent):
 - 0.127mm, 0.178mm, 0.254mm, 0.330mm
- 정밀도(Accuracy) : $\pm 0.127\text{mm}$ or $\pm 0.0015 \text{ mm per mm}$

Production
series



모델 재료

Material

ABS-M30

PC-ABS

Polycarbonate

FORTUS 400mc

Base System

- Build Envelope (MM): **355 X 254 X 254**
- One Build & Support Canister Bay

Upgraded System

- Build Envelope (MM): **406 X 355 X 406**
- Two Build & Support Canister Bays
- 9가지 모델 재료 선택 가능
- Layer Thickness (Material Dependent):
 - 0.127mm, 0.178mm, 0.254mm, 0.330mm
- 정밀도 : $\pm 0.127\text{mm}$ or $\pm 0.0015\text{ mm per mm}$

SysOpt



Production
series

모델 재료

Material	Characteristic
ABS-M30	Versatile material
ABS-ESD7	Static dissipative
ABS-M30i	Biocompatible (ISO-10993)
ABSi	Translucent
PC-ABS	High Impact Strength
Polycarbonate	High Tensile Strength
PC-ISO	Biocompatible (ISO-10993)
ULTEM 9085	FST Certification, High Mechanical
PPSF/PPU	Thermal and Chemical Resistance

FORTUS 900mc

- Build Envelope (MM): **914 X 610 X 914**
- Two Build & Support Canister Bays
- 9가지 모델 재료 선택 가능
- Layer Thickness (Material Dependent):
 - 0.178mm, 0.254mm, 0.330mm
- 정밀도 : $\pm .089$ mm or $\pm .0015$ mm per mm

모델 재료

Material	Characteristic
ABS-M30	Versatile material
ABS-ESD7	Static dissipative
ABS-M30i	Biocompatible (ISO-10993)
ABSi	Translucent
PC-ABS	High Impact Strength
Polycarbonate	High Tensile Strength
PC-ISO	Biocompatible (ISO-10993)
ULTEM 9085	FST Certification, High Mechanical
PPSF/PPU	Thermal and Chemical Resistance

Production
series



Stratasys Materials



Durable

- ABS
- Production-grade
- Realistic parts
- Translucent



Functional

- Anti-static
- High strength
- Manufacturing tools



ISO-Certified

- High strength
- Sterilizable
- Food & drug



High Performance

- Flame retardant
- Chemical-resistant
- Low-toxicity
- Finished parts



Rigid

- Basic translucent
- Polypropylene-like
- High-temperature
- ABS-like
- Transparent



Flexible

- High-elongation
- High-elasticity
- Low-modulus



Bio-compatible

- Dental
- Hearing aids
- VeroBio



Composite materials

- Pre-defined Digital Materials™



FDM & Polyjet 재료 개요

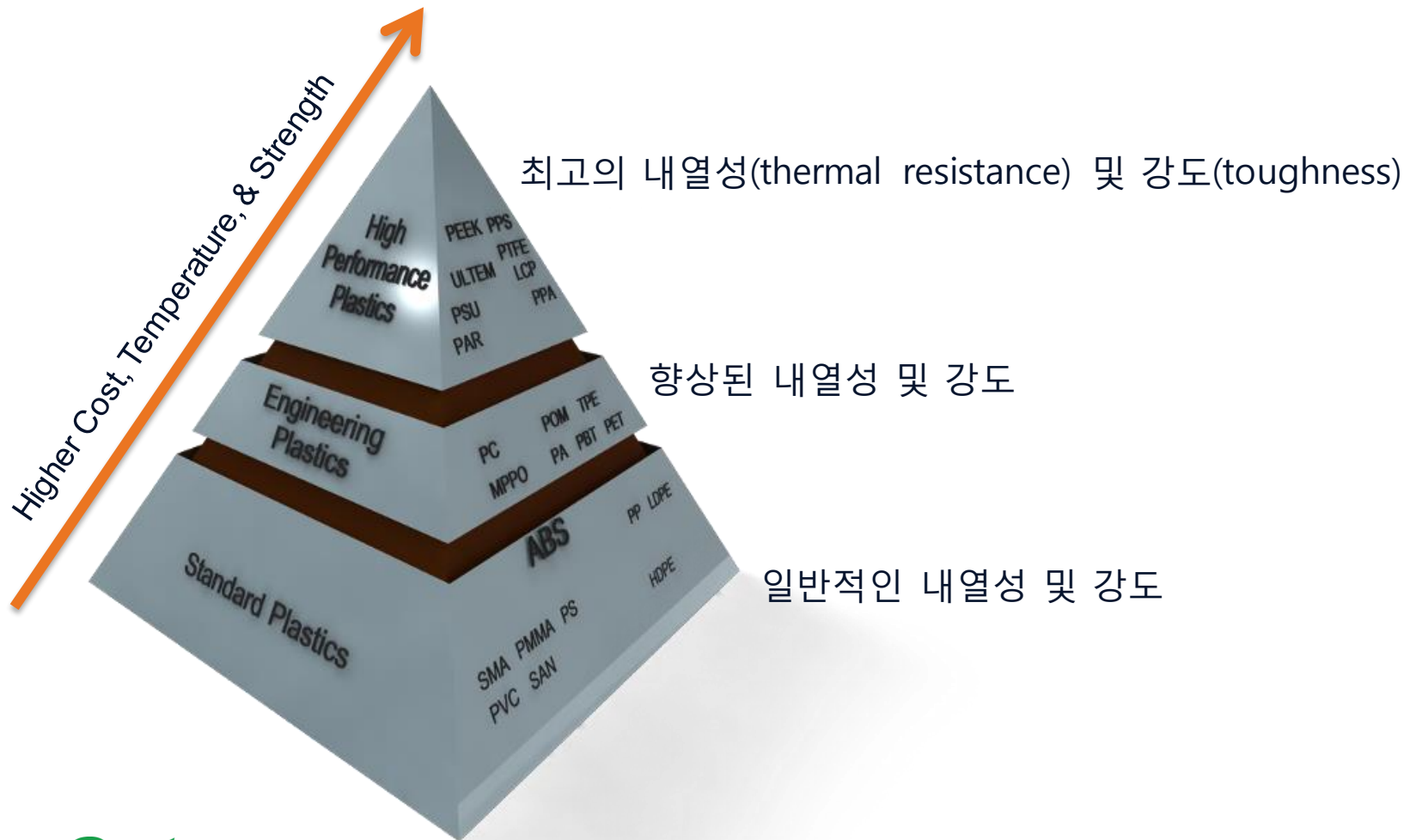
FDM Thermoplastics (performance):

- Real thermoplastics
- Advanced functional performance
- Strong, tough & durable
- Stable over time
- Economical

Polyjet Photopolymers (precision):

- Simulated plastics & elastomers
- Prototyping versatility
- Dual Material Jetting
- High precision, fine detail accuracy
- Surface smoothness

재료 / World of Plastics



- 다양한 색상의 10가지 FDM 재료

- Standard: ABS

- ABSplus
- ABS-M30
- ABS-M30i
- ABS-ESD7
- ABSi

- Engineering: Polycarbonate

- PC
- PC-ABS
- PC-ISO

- High Performance

- ULTEM® 9085
- PPSF / PPSU



FDM 재료



Category	FDM Material	Key Characteristics
STANDARD PLASTICS ABS Family (Versatility)	ABSi	Translucent
	ABSplus	Versatile; tough
	ABS-M30	Versatile; tougher
	ABS-M30i	Biocompatible
	ABS-ESD7	정전기 방지 (Static dissipative)
ENGINEERING PLASTICS PC Family (Robust)	PC-ABS	Strong (impact)
	PC	Strong (tension)
	PC-ISO	Biocompatible
HIGH PERFORMANCE PLASTICS	ULTEM 9085	Mechanically well-rounded; FST certification
	PPSF	Resistant (thermal/chemical)
Support	Solubles SR10, 20, 30, 100	Hands/labor free removal (cores & supports)



Thermoplastics

Durable

- ABS
- Production-grade
- Realistic parts
- Translucent



Functional

- Anti-static
- High strength
- Manufacturing tools



Industry-Ready

- High strength
- Sterilizable
- Food & drug



High-Performance

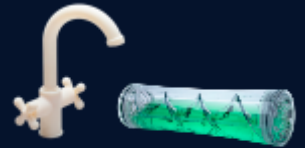
- Flame retardant
- Chemical-resistant
- Low-toxicity
- Finished parts



Photopolymers

Rigid

- Opaque
- General purpose translucent
- Polypropylene-like
- High-temperature
- Digital ABS
- Transparent



Flexible, Rubber-like

- High-elongation
- Different shore levels
- High Tear Resistance



Medical / Biocompatible

- Hearing Aids
- Clear material
- Dental



Digital Composite Materials

- Pre-defined Digital Materials™



Stratasys - Applications



**From Concept Modeling
To Advanced Prototyping
To Final Production Parts**



SysOpt

감사합니다.

(주)시스옵엔지니어링

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