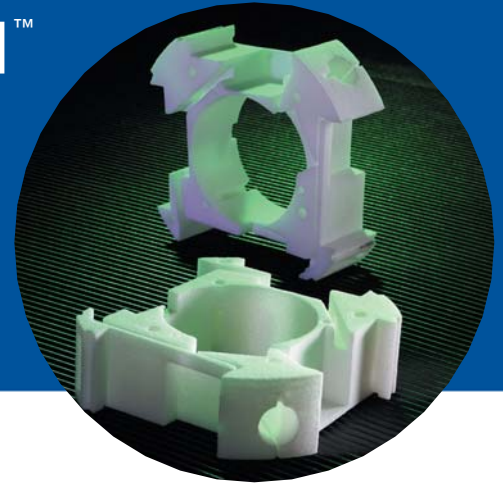




# ACCURA® DURAFORM™ PA & GF MATERIAL

for all laser sintering (LS) systems



Science Cup  
Courtesy of NASA Jet Propulsion Lab

**Create durable, high-quality fully testable nylon thermoplastic parts for functional testing with Accura DuraForm material and an SLS system - from 3D Systems**



3D Systems' Vanguard SLS system

## The SLS™ process

DuraForm™ polyamide (PA) and DuraForm glass-filled (GF) nylon materials are part of the growing family of Accura® LS (laser sintering) materials developed specifically for use in 3D Systems' SLS® (selective laser sintering) systems. These two DuraForm materials produce rugged engineering thermoplastic parts that withstand aggressive functional testing.



Build functional parts - quickly, easily and with minimal labor.

Choose DuraForm PA material for detailed parts and medical applications.

DuraForm PA material is ideal for parts with superior surface quality, fine details, and functional features such as living hinges and snap fit connections. Plus DuraForm PA material is USP Level VI certified for brief *in-vivo* exposure; it can be used for modeling and testing surgical devices, and can be sterilized with an autoclave.

Choose DuraForm GF material for adverse testing conditions.

DuraForm GF material's increased stiffness, heat resistance, and mechanical integrity (relative to PA) make it a perfect material for extreme testing conditions. As an example, a DuraForm material connector with snap fits, hinges and locking cams recently withstood temperatures up to 100°C and an electrical charge of 460 Amps (twice the amperage withstood by the final production part).

Shorten product testing and development cycles.

DuraForm materials trim days, even weeks from your product development times by letting you create high-quality, fully-testable parts in the SLS system, directly from 3-D CAD files; no tooling is required.

## Benefits:

- Durable parts without tooling
- Heat and chemical resistant
- Machinable, weldable, readily joined mechanically or with adhesives
- Excellent surface finish
- High feature definition and detail
- High durability and stability
- USP Level VI certified; sterilized in an autoclave (PA only)

## Applications:

- Form, fit models or prototypes
- Functional testing
- Snap-fit assemblies
- Durable patterns for sandcasting and silicone tooling
- Production parts

# Accura DuraForm PA and GF material

for all laser sintering (LS) systems

## Typical Properties

### Powder Properties

PROPERTIES	CONDITION	UNITS	TEST METHOD	PA	GF
Density	Tap	g/cm <sup>3</sup>	ASTM D4164	0.59	0.84
Particle Size Average <sup>(1)</sup>		μm	Laser Diffraction	58	48
Particle Size Range <sup>(1)</sup>	90%	μm	Laser Diffraction	25-92	10-96
Specific Gravity	20°C		ASTM D792	0.97	1.40
Moisture Absorption	23°C	%	ASTM D570	0.41	0.30

### Thermal Properties

PROPERTIES	CONDITION	UNITS	TEST METHOD	PA	GF
Melting Point:	T <sub>m</sub>	°C	DSC	184	185
DTUL	0.45 MPa	°C	ASTM D648	177	175
DTUL	1.82 MPa	°C	ASTM D648	86	110

### Mechanical Properties

PROPERTIES	CONDITION	UNITS	TEST METHOD	PA	GF
Tensile Strength		MPa	ASTM D638	44	38.1
Tensile Modulus		MPa	ASTM D638	1600	5910
Tensile Elongation at Break		%	ASTM D638	9	2
Flexural Modulus		MPa	ASTM D790	1285	3300
Impact Strength	Notched Izod	J/m	ASTM D256	214	96
	Unnotched Izod	J/m	ASTM D256	428	101

### Surface Finish

PROPERTIES	CONDITION	UNITS	PA	GF
Upper Facing	As Processed (R <sub>a</sub> )	μm	8.5	6.2
	After Polishing (R <sub>a</sub> )	μm	0.13	1.0

### Chemical Resistance

PROPERTIES	CONDITION	UNITS	PA	GF
	Alkalines, hydrocarbons, fuels and solvents			

### Electrical Properties

PROPERTIES	CONDITION	UNITS	TEST METHOD	PA	GF
Volume Resistivity	22°C, 50% RH, 500V	ohm x cm	ASTM D257-93	3.1x10 <sup>14</sup>	2.0Ex10 <sup>14</sup>
Surface Resistivity	22°C, 50% RH, 500V	ohm x cm	ASTM D257-93	3.0x10 <sup>14</sup>	2.3Ex10 <sup>14</sup>
Dielectric Constant	22°C, 50% RH, 500V		D150-95	2.9	3.7
Dielectric Strength		v/mm	D149-95a	1.6x10 <sup>4</sup>	1.5Ex10 <sup>4</sup>
Comparative Tracking Index		V	D5288-92	585, TI-Cu and/or IEC Standard	TBD <1mm depth

(1) Results are based upon volume distribution of particles.

Data was generated from the testing of parts produced with the DuraForm materials under typical processing conditions. (New materials processed at 4 watts laser power, 165mm/sec scan speed, 0.1 mm scan spacing, 0.1 mm layer thickness on a Sinterstation® 2500 SLS system. Expected shelf life of this material is at least twelve months, when stored in dry conditions at ambient temperatures. Warranty/Disclaimer: The performance characteristics of these products may vary according to product application, operating conditions, material combined with, or with end use. 3D Systems makes no warranties of any type, express or implied, including, but not limited to, the warranties of merchantability or fitness for a particular use.



## 3D Systems

26081 Avenue Hall  
Valencia, CA 91355 USA  
telephone 661.295.5600, ext. 2882  
fax 661.294.8406  
toll free 888.337.9786  
email [moreinfo@3dsystems.com](mailto:moreinfo@3dsystems.com)

[www.3dsystems.com](http://www.3dsystems.com)

Nasdaq: TDSC

#### FRANCE

telephone +33 1 69 35 17 17

#### GERMANY

telephone +49 6151 357 303

#### HONG KONG

telephone +852 2923 5077

#### ITALY

telephone +39 039 68 904 00

#### JAPAN

telephone +81 3 5451 1690

#### UK

telephone +44 1442 282600

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