

Details Stereolithography

Standard lead time:	From 2 days, depending on the size of the parts and the number of components.
Standard accuracy:	Standard stereolithography $\pm 0.2\%$ (min $\pm 0.2\text{mm}$). Sensitive to UV-light (e.g. direct sunlight).
Surface finish:	Without post-finishing, dependent upon the orientation of the layers. Different finishes from high gloss to a rough texture are obtained by post-finishing.
Maximum part dimensions:	2100x700x800mm
Capacity:	Materialise has over 30 stereolithography machines: 4 Next Day machines; 13 Mammoth machines; 8 SLA250 machines; 3 SLA3500 machines; 1 SLA5000 machine and 4 SLA7000 machines.
Materials:	Tusk Somos® SolidGrey3000 TuskXC2700T / Tusk2700W Protogen White Poly1500 Xtreme NeXt NanoTool Xtreme WaterClear

Details Next Day Stereolithography

Lead time:	Parts ordered before 12am are shipped the same day.
Accuracy:	$\pm 0.2\%$ (min $\pm 0.2\text{mm}$)
Surface finish:	Basic finishing
Maximum part dimensions:	650x650x480mm (x, y, z)
Capacity:	The overall Next Day capacity is sufficient to produce supported parts that fit in an envelope of 650x650x480mm (x, y, z). Our stereolithography machine park houses 4 Next Day machines.
Materials:	Poly1500 Tusk2700W Protogen White

Details Mammoth Stereolithography

Lead time:	From 2 days, depending on the size of the parts and the number of components
Accuracy:	$\pm 0.2\%$ (min $\pm 0.2\text{mm}$)
Surface finish:	Different finishes from smooth finish up to high gloss can be obtained by post-finishing
Maximum part dimensions:	2100x700x800mm
Capacity:	13 Mammoth machines
Materials:	Tusk Somos® SolidGrey3000 TuskXC2700T Protogen White Poly1500



Datasheet		Actual values may vary with build conditions	
Tusk Somos [®] SolidGrey3000			
	Units	ASTM#	Range
Tensile Modulus	MPa	D638M	2970 – 3285
Tensile Strength at yield	MPa	D638M	60 - 66
Elongation at Yield	%	D638M	3.0
Elongation at Break	%	D638M	4.6 – 7.2
Flexural Modulus	MPa	D790M	1843 - 2017
Hardness	ShoreD	D2240	84
Notched Izod Impact	J/m	D256A	30 – 35
Water Absorption	%	D570-98	0.36 – 0.40
Tg	°C	E1545-05a	40-48
Deflection Temperature (0.46MPa)	°C	D648 - 07B	53 – 57
Deflection Temperature (1.82MPa)	°C	D648 - 07B	49 - 57
Appearance	Opaque Gray		

- ✓ Stiff
- ✓ Impact resistant
- ✓ Water resistant
- ✓ Durable

- ✓ Automotive body parts
- ✓ Machine covers
- ✓ Functional prototypes
- ✓ Durable concept models
- ✓ Robust scale models

Datasheet		Actual values may vary with build conditions	
TuskXC2700T / Tusk2700W			
	Units	ASTM#	Range
Tensile Modulus	MPa	D638M	2650 - 2880
Tensile Strength	MPa	D638M	47.1 - 53.6
Elongation at Break	%	D638M	11 - 20
Flexural Modulus	MPa	D790M	2040 - 2370
Flexural Strength	MPa	D790M	63.1 - 74.16
Notched Izod Impact	J/m	D256A	20 - 30
Hardness	Shore D	D2240	81
Heat Deflection t°	°C	D648 - 98c	at 0.46 MPa: 45.9 - 54.5 at 1.81 MPa: 49.0 - 49.7
Colour	Transparent or white		

- ✓ Transparent (TuskXC2700T)
- ✓ Strong
- ✓ Water resistant
- ✓ Durable

- ✓ Functional prototypes
- ✓ Wind tunnel testing
- ✓ Water flow analysis
- ✓ High-end finished models
- ✓ ABS-like parts

Datasheet		Actual values may vary with build conditions	
Protogen White			
	Units	ASTM#	Range
Tensile Modulus	MPa	D638M	2310
Tensile Strength	MPa	D638M	43.8
Elongation at Break	%	D638M	16
Flexural Modulus	MPa	D790M	2130
Flexural Strength	MPa	D790M	70.5
Notched Izod Impact	J/m	D256A	22
Hardness	Shore D	D2240	88
Water Absorption	%	D570-98	0.68%
Tg	°C	E1545-00	57 - 59
Heat Deflection t°	°C	D648 - 98c	at 0.46 MPa: 56 at 1.82 MPa: 47
Colour	White		

- ✓ Tough
- ✓ Good surface quality
- ✓ Good thermal properties
- ✓ Durable

- ✓ Impellers
- ✓ Duct work and connectors
- ✓ Automotive housings
- ✓ Dashboard assemblies
- ✓ High-end finished models

Datasheet		Actual values may vary with build conditions	
Poly1500			
	Units	ASTM#	Range
Tensile Modulus	MPa	D638M	1227 - 1462
Tensile Strength	MPa	D638M	30 - 32
Elongation at Break	%	D638M	15 - 25
Flexural Modulus	MPa	D790M	1310 - 1455
Flexural Strength	MPa	D790M	41 - 46
Notched Izod Impact	J/m	D256A	48 - 53
Hardness	Shore D	D2240	80 - 82
Heat Deflection t° at 0,46 MPa	°C	D648	52 - 61
Colour	Translucent		

- ✓ Flexible
- ✓ Impact resistant
- ✓ Tough
- ✓ Durable

- ✓ Automotive components
- ✓ Electronic housings
- ✓ Snap-fit assemblies
- ✓ PP-like parts

Datasheet		Actual values may vary with build conditions	
NeXt			
	Units	ASTM#	Range
Tensile Modulus	MPa	D638M	2370 - 2490
Tensile Strength at Yield	MPa	D638M	41 - 43
Tensile Strength at Break	MPa	D638M	31 - 35
Elongation at Break	%	D638M	8 - 10
Flexural Modulus	MPa	D790M	2415 - 2525
Flexural Strength	MPa	D790M	68 - 71
Notched Izod Impact	J/m	D256A	47 - 52
Water Absorption	%	D570-98	0.39 - 0.41
Tg	°C	E1545-00	43-47
Heat Deflection t°	°C	D648-98c	at 0.46 MPa 55 - 57 at 1.81 MPa 48 - 51
Colour	White		

- ✓ Impact resistant
- ✓ Durable
- ✓ Tough
- ✓ Moisture resistance
- ✓ Thermal properties

- ✓ Functional prototypes
- ✓ Snap-fit assemblies
- ✓ Parts with high feature detail

Datasheet		Actual values may vary with build conditions	
NanoTool			
	Units	ASTM#	Range
Tensile Modulus	MPa	D638M	11000 - 11400
Tensile Strength	MPa	D638M	61.7 - 78
Elongation at Break	%	D638M	0.7 - 1
Flexural Modulus	MPa	D790M	10200 - 10800
Flexural Strength	MPa	D790M	79-121
Notched Izod Impact	J/m	D256A	12 - 15
Water Absorption	%	D570-98	0.23
Heat Deflection t°	°C	D648-98c	at 0.46 MPa: 225 at 1.82 MPa: 85 - 90
Colour	Off white		

- ✓ Stiff
- ✓ High temperature resistance
- ✓ Superior sidewall quality
- ✓ Brittle

- ✓ High temperature applications
- ✓ Automotive
- ✓ Aerospace

Datasheet	Actual values may vary with build conditions		
Xtreme			
	Units	ASTM#	Range
Tensile Modulus	MPa	D638M	1790 - 1980
Tensile Strength	MPa	D638M	38 - 44
Elongation at Break	%	D638M	14 - 22
Flexural Modulus	MPa	D790M	1520 - 2070
Notched Izod Impact	J/m	D256A	35 - 52
Heat Deflection t°	°C	D648-98c	at 0.45 MPa: 62 at 1.82 MPa: 54
Colour	Grey		

- ✓ Tough
- ✓ Impact resistant
- ✓ High elongation at break
- ✓ Excellent surface quality

- ✓ Tough enclosures
- ✓ Snap-fit assemblies
- ✓ Replacing CNC machined parts
- ✓ High-end finished models

Datasheet	Actual values may vary with build conditions		
WaterClear			
	Units	ASTM#	Range
Tensile Modulus	MPa	D638M	2860 - 2900
Tensile Strength at Break	MPa	D638M	55 - 56
Elongation at Break	%	D638M	6 - 9
Flexural Modulus	MPa	D790M	2410 - 2570
Flexural Strength	MPa	D790M	82 - 85
Notched Izod Impact	J/m	D256A	24 - 26
Water Absorption	%	D570-98	1.1
Tg	°C	E1545-00	42 - 46
Heat Deflection t°	°C		At 0.46 Mpa: 46 - 47 At 1.82 MPa: 42 - 43
Colour	transparent		

- ✓ Optically clear
- ✓ Lower mechanical properties than TuskXC2700T

- ✓ Prototype parts that require fully neutral transparency

Stereolithography Material Properties



Name	Impact strength	Stiffness	Humidity resistance	Heat resistance	Durability	Appearance	Mould Making	Details	Description	Applications
Tusk Somos® SolidGrey3000	Excellent	Excellent	Excellent	Good	Good	Grey	Good	Good	Stiff Impact resistant Water resistant Durable	Automotive body parts Machine covers Functional prototypes Durable concept models Robust scale models
TuskXC2700T Tusk2700W	Good	Good	Excellent	Sensitive	Good	Optical clear with a light blue tinge or White	Excellent	Moderate	Tough Impact resistant High elongation at break Excellent surface quality	Functional prototypes Wind tunnel testing Water flow analysis High-end finished models ABS-like parts
Protogen White	Good	Good	Good	Good	Good	White	Excellent	Good	Tough Good surface quality Good thermal properties Durable	Impellers Duct work and connectors Automotive housings Dashboard assemblies High-end finished models
Poly1500	Good	Moderate	Moderate	Moderate	Good	Translucent	Moderate	Good	Flexible Impact resistant Tough Durable	Automotive components Electronic housings Snap-fit assemblies PP-like parts
Xtreme	Excellent	Good	Good	Good	Good	Grey	Good	Excellent	Tough Impact resistant High elongation at break Excellent surface quality	Tough enclosures Snap-fit assemblies Replacing CNC machined parts High-end finished models
NeXt	Excellent	Good	Excellent	Good	Excellent	White	Good	Excellent	Impact resistant Durable Tough Moisture resistance Thermal properties	Functional prototypes Snap-fit assemblies Parts with high feature detail
NanoTool	Sensitive	Excellent	Excellent	Excellent	Excellent	Off white	Moderate	Excellent	Stiff High temperature resistance Superior sidewall quality Brittle	High temperature applications Automotive Aerospace
WaterClear	Good	Good	Moderate	Sensitive	Good	Optical clear with neutral tinge	Excellent	Moderate	Optically clear Lower mechanical properties than TuskXC2700T	Prototype parts that require fully neutral transparency

The information and values included in these datasheets, although based on Materialise's knowledge and experience and thus presented in good faith and believed to be accurate, is provided for your guidance only. This information does not release a third party from conducting his own procedures and tests to determine suitability. All guarantees with respect to the information contained herein are explicitly denied.

Last update: 22/05/2013

Details PolyJet Digital Materials

Standard lead time: 2-4 working days

Standard accuracy: 0.1-0.3mm
(accuracy varies according to geometry, part orientation and print size)

Surface finish: Basic finish
From high gloss to a rough texture are obtained by post-finishing

Maximum part dimensions: 500x400x200 mm (x,y,z)

Capacity: 1 Objet Connex machine

Primary Materials: **Objet VeroWhitePlus** is a general-purpose resin and has a white colour offering enhanced mechanical properties and the ability to withstand bending.
Objet TangoBlackPlus is a flexible rubber-like resin, offering exceptional elongation at break, making it suitable for prototypes of rubber components like seals, non-slip surfaces, etc.

Digital Materials: Composite materials with preset combinations of mechanical properties.
Shore A40 - Shore A50 - Shore A60 - Shore A70 - Shore A85 - Shore A95

Multi-Material Models: To combine materials with different properties in one model. Separate STL files are needed.

Datasheet	Actual values may vary with build conditions			
PolyJet				
	Units	ASTM#	Objet VeroWhitePlus	Objet TangoBlackPlus
Tensile Strength	MPa	D-638	49.8	1.5
Elongation at Break	%	D-638	15% - 25%	218
Modulus of Elasticity	MPa	D-638	2495	
Flexural Strength	MPa	D790	74.6	
Flexural Modulus	MPa	D790	2137	
Notched Izod Impact	J/m	D256	37.5	
SHORE	Shore A	Scale D	83.0	27
Rockwell	Scale M	Scale M	81.0	
Heat Distortion Temperature	°C	D648 @ 0.45MPa	47.6	
	°C	D648 @ 1.82MPa	43.6	
Tg	°C	DMA, E"	58.0	-10
Ash Content			<0.40%	
Tensile Tear resistance	Kg/cm	D-324		3
Colour			White	Black

Datasheet	Actual values may vary with build conditions					
PolyJet Digital Materials						
Primary material: VeroWhitePlus Secondary material: TangoBlackPlus	DM_9840/ Shore A40	DM_9850/ Shore A50	DM_9860/ Shore A60	DM_9870/ Shore A70	DM_9885/ Shore A85	DM_9895 Shore A95
Tensile Strength (MPa)	0.5-1.5	0.5-1.5	2-4	2-4	4-8	15-25
Elongation at Break (%)	150-170	130-150	80-100	50-70	50-60	25-35
SHORE (Scale A)	35-45	45-55	55-65	65-75	80-90	90-100
Colour	Black	Black	Black	Black	Black	Black

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Details Laser Sintering

Standard lead time: From 4 working days depending on part size, number of components and finishing degrees.
From 2 working days for smaller parts.

Standard accuracy: $\pm 0.3\%$ (with lower limit of ± 0.3 mm).

Surface finish: Laser Sintering parts typically have a grainy surface but all kinds of (very) fine finishing are possible. They can be sandblasted, coloured (dyed), painted, covered, coated, polished, chemically smoothed, ...

Maximum part dimensions: Dimensions are unlimited when the parts may be composed of several sub-parts. The build area is 650x330x560mm.

Minimum wall thickness: 0.8 mm (1mm for alumide and PA-GF), but living hinges are possible at 0.3 mm

Capacity: 8 Sinterstation 2500/Vanguard HS HiQ with a build volume of 320x270x420mm
5 EOS P380-395 machines with a build volume of 310x310x600mm
5 EOSINT P730 machines with a build volume of 650x330x560mm
1 EOS Formiga P100 machine with a build volume of 170x215x325 mm

Datasheet					
Laser Sintering					
	Units	Condition	PA 12	PA-GF	Alumide
Description			Polyamide 12- standard	Stiff	Stiff, metallic look, and easy to mill
Tensile Modulus	MPa	DIN EN ISO 527	1650+/- 150	3200 +/- 200	3800+/- 150
Tensile Strength	MPa	DIN EN ISO 527	48 +/- 3	51 +/- 3	48 +/- 3
Elongation at Break	%	DIN EN ISO 527	20 +/- 5	6 +/- 3	3.5 +/- 1
Flexural Modulus	N/mm ²	DIN EN ISO 178	1500 +/- 130	2900 +/- 150	3600 +/- 150
Charpy – Impact strength	MPa	DIN EN ISO 179	53 +/- 3.8	35 +/- 6	29 +/- 2
Charpy – Notched Impact Strength	MPa	DIN EN ISO 179	4.8 +/- 0.3	5.4 +/- 0.6	4.6 +/- 0.3
Izod – Impact Strength	kJ/m ²	DIN EN ISO 180	32.8 +/- 3.4	21.3 +/- 1.7	NA
Izod - Notched Impact Strength	kJ/m ²	DIN EN ISO 180	4.4 +/- 0.4	4.2 +/- 0.3	NA
Ball Indentation Hardness		DIN EN ISO 2039	77.6 +/- 2	98	NA
Shore D/ A-hardness		DIN 53505	D 75 +/- 2	D 80 +/- 2	D 76 +/- 2
Heat Deflection t°	°C	ASTM D648 (1.82MPa)	86	110	130
Vicat Softening Temperature B/50	°C	DIN EN ISO 306	163	163	169
Vicat Softening Temperature A/50	°C	DIN EN ISO 306	181	179	NA
Density	g/cm ³		0.95 +/- 0.03	1.22 +/- 0.03	1.36 +/- 0.05



Datasheet			
TPU 92A-1			
	Units	Condition	TPU 92A-1
Description			Strong and Flexible
Tensile Strength	MPa	DIN EN ISO 527	27
Elongation at Break	%	DIN EN ISO 527	400
Flexural Modulus	N/mm ²	DIN EN ISO 178	9
Shore D/ A-hardness		DIN 53505	A 92
Abrasion resistance	mm ³	ISO 4649	31
Vicat Softening Temperature A/50	°C	DIN EN ISO 306	90
Density	g/cm ³		1.2

Datasheet			
PA 2241 FR			
	Units	Condition	PA 2241 FR
Description			Passes aerospace flame resistance tests FAR 25.853
Tensile Modulus	MPa	DIN EN ISO 527	1900
Tensile Strength	MPa	DIN EN ISO 527	49
Elongation at Break	%	DIN EN ISO 527	15
Shore D/ A-hardness		DIN 53505	
Heat Deflection t°	°C	ASTM D648 (1.82MPa)	84
Vicat Softening Temperature B/50	°C	DIN EN ISO 306	
Vicat Softening Temperature A/50	°C	DIN EN ISO 306	
Density	g/cm ³		1.00 +/- 0.03
Flammability properties	mm	JAR/FAR 25, App. F, part 1 AITM 2.0002 B Vertical Bunsen Burner Test 12s Ignition Time	1.0/1.5/2.0
Smoke generation	mm	JAR/FAR 25, App. F – Part V & AITM 2.0007	1.0/1.5/2.0
Toxic gas generation	mm	AITM 3.0005	1.0/1.5/2.0

Details FDM

Standard lead time: 4-5 days

Layer thickness: 0.13 - 0.25mm (for ABS)
0.13 - 0.25mm (for ABSi)
0.18 - 0.25mm (for ABS-M30)
0.18 - 0.25mm (for ABS-M30i)
0.18mm (for ABS-ESD7)
0.18 - 0.25mm (for PC)
0.18 - 0.25mm (for PC-iso)
0.18 - 0.25mm (for PC-ABS)
0.25mm (for PPSU)
0.25mm (for ULTEM™ 9085)

Standard accuracy: $\pm 0.1\%$ (min $\pm 0.2\text{mm}$)

Surface finish: FDM parts typically have a rough surface but all kinds of (very) fine finishing are possible. They can be smoothed and painted.

Maximum part dimensions: Dimensions are unlimited as parts may be composed of several subparts. The maximum build envelope is 914x610x914mm.

Capacity: 4 Fortus 900 MC with a build area of 914x610x914 mm
1 Vantage with a build area of 400x350x400 mm
8 400MC machines with a build area of 355x254x254 mm
3 Titan machines with a build area of 400x350x400 mm
14 Maxum machines with a build area of 600x500x600 mm
2 250MC machines with a build area of 250x250x250mm

Materials: FDM uses production-grade thermoplastic materials, suitable for detailed functional prototypes, durable manufacturing tools and low-volume manufacturing parts. Available materials:

ABS
ABSi
ABS-M30
ABS-M30i
ABS-ESD7
PC
PC-ISO
PC-ABS
PPSU
ULTEM 9085™

Datasheet		Actual values may vary with build conditions	
ABS (Acrylonitrile / butadiene / styrene)			
	Units	ASTM#	Range
Tensile Strength	MPa	D638	22
Tensile Modulus	MPa	D638	1627
Flexural Strength	MPa	D790	41
Flexural Modulus	MPa	D790	1834
Notched Izod Impact	J/m	D256	107
Unnotched Izod Impact	J/m	D256	214
Heat Deflection t°	°C	D648	at 0.45 MPa: 90 at 1.81 MPa: 76
Density	g/cm ³		1.05
Elongation at Break	%		6
Colours		Blue, yellow, red, steel grey, green, black, white, grey	

- ✓ Up to 80% of the strength of injection moulded ABS
- ✓ Durable
- ✓ Multiple colours available
- ✓ End-use components
- ✓ Jigs and fixtures
- ✓ Concept modelling
- ✓ Form, fit, and function testing

Datasheet		Actual values may vary with build conditions	
ABSi (Methyl methacrylate-acrylonitrile-butadiene-styrene copolymer)			
	Units	ASTM#	Range
Tensile Strength	MPa	D638	37
Tensile Modulus	MPa	D638	1915
Flexural Strength	MPa	D790	62
Flexural Modulus	MPa	D790	1917
Notched Izod Impact	J/m	D256	96.4
Unnotched Izod Impact	J/m	D256	191.1
Heat Deflection t°	°C	D648	at 0.45 MPa: 86 at 1.81 MPa: 73
Density	g/cm ³		1.08
Elongation at Break	%		4.4
Colour		Translucent	

- ✓ More stiff than ABS
- ✓ More durable than ABS
- ✓ Translucent
- ✓ End-use components
- ✓ Monitoring material flow
- ✓ Monitoring light transmission
- ✓ Medical applications
- ✓ Automotive applications

Datasheet		Actual values may vary with build conditions	
ABS-M30 (Acrylonitrile / butadiene / styrene)			
	Units	ASTM#	Range
Tensile Strength	MPa	D638	36
Tensile Modulus	MPa	D638	2413
Flexural Strength	MPa	D790	61
Flexural Modulus	MPa	D790	2317
Notched Izod Impact	J/m	D256	139
Unnotched Izod Impact	J/m	D256	283
Heat Deflection t°	°C	D648	at 0,45 MPa: 96 at 1,81 MPa: 82
Density	g/cm ³		1,04
Elongation at Break	%		4
Colour		Ivory, White, Black, Dark Grey, Red, Blue	

- ✓ 25-75% stronger than the standard ABS material
- ✓ Durable
- ✓ Fine feature detail
- ✓ Snap-fits
- ✓ End-use components
- ✓ Jigs and fixtures
- ✓ Concept modelling
- ✓ Form, fit, and function testing

Datasheet		Actual values may vary with build conditions	
ABS-M30i (Biocompatible Acrylonitrile/Butadiene/Styrene)			
	Units	ASTM#	Range
Tensile Strength	MPa	D638	36
Tensile Modulus	MPa	D638	2413
Flexural Strength	MPa	D790	61
Flexural Modulus	MPa	D790	2317
Notched Izod Impact	J/m	D256	139
Unnotched Izod Impact	J/m	D256	283
Heat Deflection t°	°C	D648	at 0,45 MPa: 96 at 1,81 MPa: 82
Density	g/cm ³		1,04
Elongation at Break	%		4
Colour		Ivory	

- ✓ Biocompatible: raw material meets ISO 10993
- ✓ 25-75% stronger than the standard ABS material
- ✓ Durable
- ✓ Fine feature detail
- ✓ Medical devices
- ✓ Food and drug packaging
- ✓ End-use components
- ✓ Form, fit, and function testing

Datasheet		Actual values may vary with build conditions	
ABS-ESD7			
	Units	ASTM#	Range
Tensile Strength	MPa	D638	36
Tensile Modulus	MPa	D638	2400
Flexural Strength	MPa	D790	61
Flexural Modulus	MPa	D790	2400
Notched Izod Impact	J/m	D256	111
Unnotched Izod Impact	J/m	D256	55
Heat Deflection t°	°C	D648	at 0,45 MPa: 96 at 1,81 MPa: 82
Volume Resistivity	ohms	D257	4.10 ¹⁰ - 3.0 ⁹
Surface Resistance	ohms	D257	10 ⁹ -10 ⁶
Colour		Black	

- ✓ Electrostatic dissipative
- ✓ Durable
- ✓ End-use components
- ✓ Electronic products
- ✓ Industrial equipment
- ✓ Jigs and fixtures for assembly of electronic components

Datasheet		Actual values may vary with build conditions	
PC (Polycarbonate)			
	Units	ASTM#	Range
Tensile Strength	MPa	D638	68
Tensile Modulus	MPa	D638	2280
Flexural Strength	MPa	D790	104
Flexural Modulus	MPa	D790	2234
Notched Izod Impact	J/m	D256	53
Unnotched Izod Impact	J/m	D256	320
Heat Deflection t° at 1,81 MPa	°C	D648	at 0,45 MPa: 138 at 1,81 MPa: 127
Density	g/cm ³		1.2
Elongation at Break	%		4.8
Flame Retardancy		UL 94	V-2 1.1mm
Colour		White	

- ✓ Impact strength
- ✓ Temperature resistance
- ✓ Durable
- ✓ Snap-fits
- ✓ End-use components
- ✓ Jigs and fixtures
- ✓ Concept modelling
- ✓ Form, fit, and function testing

Datasheet		Actual values may vary with build conditions	
PC-ISO (Polycarbonate ISO)			
	Units	ASTM#	Range
Tensile Strength	MPa	D638	57
Tensile Modulus	MPa	D638	998
Flexural Strength	MPa	D790	90
Flexural Modulus	MPa	D790	2140
Notched Izod Impact	J/m	D256	53
Unnotched Izod Impact	J/m	D256	86
Heat Deflection t°	°C	D648	at 0,45 MPa: 133 at 1,81 MPa: 127
Density	g/cm ³	D792	1.2
Elongation at Break	%	D638	4.3
Colour		White or translucent	

- ✓ Biocompatible: raw material meets USP Class VI and ISO 10993-1
- ✓ Impact strength
- ✓ Temperature resistance
- ✓ Durable

- ✓ Medical devices
- ✓ Food and drug packaging
- ✓ End-use components
- ✓ Form, fit, and function testing

Datasheet		Actual values may vary with build conditions	
PC-ABS (Polycarbonate / ABS blend)			
	Units	ASTM#	Range
Tensile Strength	MPa	D638	41
Tensile Modulus	MPa	D638	1917
Flexural Strength	MPa	D790	68
Flexural Modulus	MPa	D790	1931
Notched Izod Impact	J/m	D256	196
Unnotched Izod Impact	J/m	D256	481
Heat Deflection t°	°C	D648	at 0,45 MPa: 110 at 1,81 MPa: 96
Density	g/m ³		1.2
Colour		Black	

- ✓ Impact strength
- ✓ Temperature resistance
- ✓ Durable

- ✓ Snap-fits
- ✓ End-use components
- ✓ Jigs and fixtures
- ✓ Concept modelling
- ✓ Form, fit, and function testing

Datasheet		Actual values may vary with build conditions	
PPSU (Polyphenylsulfone)			
	Units	ASTM#	Range
Tensile Strength	MPa	D638	55
Tensile Modulus	MPa	D638	2068
Flexural Strength	MPa	D790	110
Flexural Modulus	MPa	D790	2206
Notched Izod Impact at 73°C	J/m	D256	59
Un-notched Izod Impact	J/m	D256	165.5
Heat Deflection t° at 1,81 MPa	°C	D648	189
Density	g/cm ³		1.28
Elongation at Break	%		3
Flammability		UL94	V-0 1.5mm
Colour		Tan	

- ✓ High mechanical performance
- ✓ Temperature resistance
- ✓ Chemical resistance
- ✓ Flame retardant

- ✓ Medical components
- ✓ Automotive components
- ✓ Aerospace components



Datasheet		Actual values may vary with build conditions	
ULTEM™ 9085			
	Units	ASTM#	Range
Tensile Strength	MPa	D638	72
Tensile Modulus	MPa	D638	2220
Flexural Strength	MPa	D790	115
Flexural Modulus	MPa	D790	2507
Notched Izod Impact	J/m	D256	106
Unnotched Izod Impact	J/m	D256	613.8
Heat Deflection t° at 1,81 MPa	°C	D648	153
Density	g/cm³		1,34
Elongation at Break	%		5.9
Oxygen Index	%	D2863	49
Vertical Burn (Test a (60s), passes at)	secs	FAR25.853	2
FAA Flammability (Method A/B)		FAR25.853	<5
OSU Peak Heat Release (5 minute test)	kW/m²	FAR25.853	36
OSU Peak Heat Release (2 minute test)	kW/min-/m²	FAR25.853	16
Flammability		UL94	V-0 1.5mm
Colour		Tan	

- ✓ Superior mechanical performance
- ✓ Excellent strength to weight ratio
- ✓ Flame resistant: low flame, low smoke and low toxicity
- ✓ Temperature resistance

- ✓ Aircraft components
- ✓ Automotive components

Details High Speed Milling

Standard lead time: 5 - 10 working days.

Standard accuracy: ± 0.1 mm (up to ± 0.05 mm possible)

Suitable materials for HSM: Aluminium, plastics (also fibre reinforced), high-density polyurethane foam, resins.

Typical applications: Aluminium and plastic parts for functional prototypes.
Solid foam models for design evaluation.
Master parts for RIM moulding.
Largest application is the manufacturing of aluminium and resin moulds.

Details Vacuum Casting

Standard lead time: Up to 10 copies within 10 days.

Standard accuracy: Standard tolerance level $\pm 0.3\%$, with a minimum tolerance of ± 0.3 mm on dimensions smaller than 100mm.

Surface finish: High surface finishing quality, comparable to injection moulding.

Maximum part dimensions: The size of the mould is limited by the dimensions of the vacuum chamber (1900 x 900 x 750mm) and by the volume of the product (maximum volume: 10 litres).

Minimum wall thickness: To ensure proper filling of the mould, a wall thickness of at least 0.5mm is required. Best results are obtained with a wall thickness of at least 1.5mm.

Typical quantities: Up to 25 copies/mould (depending on the mould's complexity and the casting materials).

Special applications: Inserts, 2 component products.

Casting material: Broad range of different polyurethanes that are similar to rubber, TPE, PP, ABS, PC. Colours approaching RAL-standard colours are available. See datasheets for more detailed information.

Capacity: 6 Vacuum Casting machines

Datasheet		Actual values may vary with build conditions								
Rubber-like polyurethanes										
	Units	RPU1	RPU2	RPU3	RPU4	RPU5	RPU6	RPU7	RPU8	RPU9
Density	g/cm ³	1.15	1.16	1.16	1.03	1.05	1.05	1.04	1.18	1.10
Hardness 28°C	Shore A	25(23°C)	35	50	65	75	85	95	60	75
Tensile Strength	MPa	>3	>3	6	5	10	17	10	4.3	7
Tear Strength	kN/m	12	16	30	23	45	65	35	20	20
Elongation at break	%	>1000	>1000	850	750	650	650	400	255	300
Own Colour		Beige	Beige	Beige	Light Amber	Black	Black	Amber	Transparent	Black
Colourability in mass		+	+	+	+	0	0	+	+++	0
Max. Operating t°	°C	70	70	70	N.A.	80	80	80	N.A.	80

Vacuum Casting Material Properties

Datasheet										
ABS-like polyurethanes										
	Units	HMPU1	HMPU2	HMPU3	HMPU6	HMPU7	HMPU10	HMPU11	HMPU13	HMPU14
Density	g/cm ³	1.17	1.18	1.17	1.20	1.11	1.2-1.25	1.19	1.04 - 1.08	1.22 - 1.27
Hardness 25°C	Shore D	80	80	80	82	77 (23°)	85 (23°C)	80 (23°C)	87	80 - 85
Hardness 60°C	Shore D	65	70 (80°C)	70 (130C)	81	74	80 (80°C)	70 (130°C)	N.A.	N.A.
Tensile Strength	MPa	60	60	54	70	40	85	61	75	65 - 75
Tensile Modulus	MPa	N.A.	2200	1650	N.A.	N.A.	N.A.	1800	2700	2100 - 2300
Bending Strength	MPa	80	92	87	105	51	150	80	105	90 - 100
Bending Modulus	MPa	2500	2000	1600	2500	1310	4500	1850	2100	N.A.
Elongation at break	%	11	10	11	15	25	3	13	9	10 - 20
Impact Strength	kJ/m ²	60 Charpy	80-100 Charpy	56 Charpy	70 Charpy	N.A.	30 Charpy	41 Charpy	27 Izod	9 - 11 Izod
Glass Transition t°	°C	120	90		105	108	95	220	110	N.A.
Heat Deflection t°	°C	105	75 - 82	120	92	90	92	N.A.	100	75 - 85
Max. Casting Thickness	mm	5 - 10	5	5-10	5	N.A.	5	5	50	15
Own Colour		Black	Off-white	Black	White/Cream	White	Light Grey	Light Amber	Transparent	Translucent White
Colourability in mass	0/+//+/+++	0	+++	0	+	++	+	0	+++	+
Special Purpose		High t° resistance	High impact resistance	High thermal resistance	N.A.	Food safe (FDA)	N.A.	High t° resistance	UV stable	Flame retardant UL 94 V-0
Thermoplastic Similarity		ABS	ABS	PP	PA 6.6	ABS	POM, PA	PPS, Peek	PC, PMMA	N.A.

Vacuum Casting Material Properties



Datasheet									Actual values may vary with build conditions
PE-PP-like polyurethanes									
	Units	LMPU1	LMPU2	LMPU3	LMPU4	LMPU5	LMPU6	LMPU7	LMPU8
Density	g/cm ³	1.03	1.22	1.13 - 1.17	1.08	1.21	1.21	1.21	1.21
Hardness 23°C	ShoreD	70/65	70	76	70	80	80	80	80
Hardness 80°C	ShoreD	63	64	68	N.A.	N.A.	N.A.	N.A.	N.A.
Tensile Strength	MPa	30	27	40	25	47	N.A.	N.A.	26
Tensile Modulus	MPa	N.A.	942	N.A.	530	1225	N.A.	N.A.	750
Elongation at break	%	160	50	25	100	43	N.A.	N.A.	62
Tear Strength	kN/m	120	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Bending Strength	MPa	N.A.	42	80	30	60	48	64	27
Impact Strength	kJ/m ²	>80 Charpy	15 Izod	> 50 Charpy	N.A.	14 Izod	15 Izod	13 Izod	11 Izod
Bending Modulus	MPa	N.A.	1050	1200	500	1310	1010	1320	645
Glass Transition t°	°C	105	78	90	90 - 100	127 - 195	105 - 132	125 - 195	70 - 90
Heat Deflection t°		N.A.	65	N.A.	55	105 - 175*	90 - 110*	115 - 180*	45 - 60*
Own Colour		Beige	White - Beige	Translucent	Beige	Translucent	Translucent	Translucent	Translucent
Colourability in mass	0/+/+/+/+	+	++	+++	+	+++	+++	+++	+++
Thermoplastic Similarity		PE	PP	PE 30% GF	PP/PEHD	PP GF	PP	PP GF	PEHD

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Last update: 22/05/2013

Details R.I.M.

Standard lead time: First parts within 10 working days (unpainted and silicone moulds).

Standard accuracy: $\pm 0.5\%$

Maximum wall thickness: 10 to 25 mm

Minimum wall thickness: 2 to 2.5 mm depending on the part's complexity

Maximum dimensions: Depending on thickness and complexity but over 1.5 m

Typical series size: 10 to 500 or more

Casting material: A broad range of different polyurethanes that are similar to PA, PE, PP or ABS.

Process: Low-pressure reaction injection moulding

Tool types: Silicone tools based on STEREO LITHOGRAPHY masters
Hybrid tools based in STEREO LITHOGRAPHY masters
Rigid (hand lay up) tools based on STEREO LITHOGRAPHY masters
Machined (PU) tools

Surface finish: High surface finishing after painting.

- Different finishing degrees:
- standard finish, without painting, filler, sand...
- painted: high gloss, satin, texture, quality degrees
- other: - EMC, carbon-like, tissue, leather - labelling

Capacity: 4 RIM machines: 1kg/min, 4.5kg/min, 5 kg/min, and up to 40kg/min.

Datasheet		Average values obtained on standardised specimens	
Rubber-like polyurethanes			
	Units	Condition	RIM1
Tensile Strength	MPa	ISO 527 - 66	7
Elongation at Break	%	ISO 527 - 66	300
Hardness	Shore A	ISO 868 - 85	73
Own colour			Black
Special purpose			Sealings

Datasheet		Average values obtained on standardised specimens		
PE-PP-ABS-like polyurethanes				
	Units	Condition	RIM 2	RIM 4
Flexural Modulus of elasticity	MPa	ISO 178 – 93	800	1800-2000
Tensile Strength	MPa	ISO 527 – 96	28	40-50
Elongation at Break	%	ISO 527 – 96	50	15-30
Impact Resistance	KJ/m ²	ISO 179/1 eU-93	100	>30
Hardness	Shore D1	ISO 868 – 85	73	75-80
Maximum Usage Temperature	°C		-40/+90	-20/+90
Own colour			Black	Black
Special purpose			Impact resistant	Glass fibre reinforcement possible

Datasheet		Average values obtained on standardised specimens	
Flame Retardant polyurethanes			
	Units	Condition	RIM5
Tensile Modulus	MPa	ISO 178 - 93	1300-1500
Tensile Strength	MPa	ISO 527 - 66	35-40
Elongation	%	ISO 527 - 66	8-12
Impact Strength	kJ/m ²	ISO 179/1eU-93	> 27
Hardness	Shore D1	ISO 868 - 85	78-83
Maximum Usage Temperature	°C		-20/+90
Own colour			Brown
Special purpose			Flame retardant

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