

Materials Library

Advanced materials designed to deliver beautiful results.

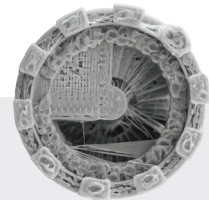



SourceGraphics

formlabs 

Exceptional Print Quality

The Form 2 delivers professional-quality printed parts at a fraction of the price.



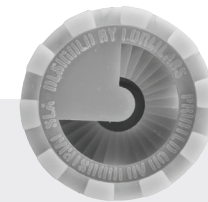
HOBBYIST FDM¹

Part cost: 0,37 €
Machine cost: 2000 €



DESKTOP SLA (FORM 2)^{1,2}

Part cost: 1,33 €
Machine cost: 3299 €



INDUSTRIAL SLA¹

Part cost: 5 €
Machine cost: 250.000 €

¹All parts printed at 100 micron layer height.

²Printed in Formlabs 'Grey Resin' — one of our Standard prototyping resins.

MATERIALS OVERVIEW

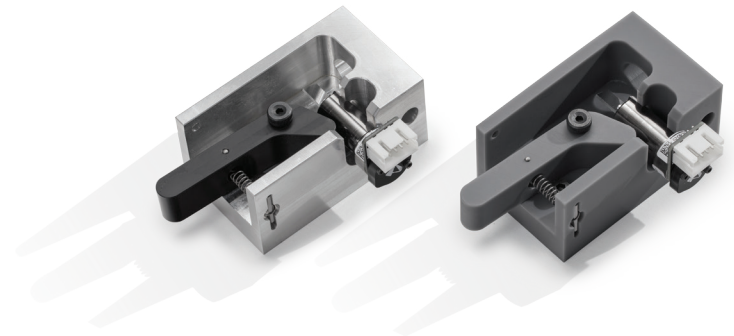
Resin	100 Microns	50 Microns	25 Microns	Application	
Standard					
Clear	✓	✓	✓	<ul style="list-style-type: none"> Polishes to transparency Internal channels 	<ul style="list-style-type: none"> Working with light Semi-gloss surface
White	✓	✓		<ul style="list-style-type: none"> Opaque Semi-gloss surface 	<ul style="list-style-type: none"> Great for large, smooth surfaces
Grey	✓	✓	✓	<ul style="list-style-type: none"> Opaque Matte surface 	<ul style="list-style-type: none"> Show details well without primer
Black	✓	✓	✓	<ul style="list-style-type: none"> Opaque Semi-gloss surface 	<ul style="list-style-type: none"> Show details well without primer
Engineering					
Tough	✓	✓		<ul style="list-style-type: none"> Snap-fit joints Assemblies 	<ul style="list-style-type: none"> Rugged prototypes
Durable	✓	✓		<ul style="list-style-type: none"> Prototyping consumer products Packaging 	<ul style="list-style-type: none"> Low-friction moving parts
Flexible	✓	✓		<ul style="list-style-type: none"> Handles, grips & overmolds Cushioning & dampening 	<ul style="list-style-type: none"> Wearables prototyping Packaging
High Temp	✓	✓	✓	<ul style="list-style-type: none"> Moldmaking prototyping Heat resistant fixtures 	<ul style="list-style-type: none"> Hot air & fluid flow Environmental testing
Jewelry					
Castable	✓	✓	✓	<ul style="list-style-type: none"> Burns out cleanly Captures fine detail 	<ul style="list-style-type: none"> Designed for Investment Casting
Dentistry					
Dental SG		✓		<ul style="list-style-type: none"> Class 1 biocompatible material 	<ul style="list-style-type: none"> Prints surgical & pilot drill guides

Our Standard Resins

High-Resolution. For demanding applications, our carefully-engineered resins capture the finest features in your model.

Strength and Precision. Our resins create accurate and robust parts, ideal for rapid prototyping and product development.

Surface Finish. Perfectly smooth right out of the printer, parts printed on the Form 2 printer have the polish and finish of a final product.



CLEAR

Our Clear Resin polishes to near optical transparency, making it ideal for showcasing internal features.



WHITE

Our White Resin emphasizes smooth surfaces and clean lines, with a warm, slightly ivory color.



GREY

Our Grey Resin has a fully matte finish, and shows details beautifully without primer.



BLACK

Our Black Resin is specially-tuned for models with very small features and intricate details.

STANDARD RESIN TECHNICAL DATA

Formlabs Standard Resin produces strong plastic parts ideal for a wide variety of applications and is specifically designed to work with your Formlabs 3D Printer. This material can be easily painted, and when the surface is finished or coated, produces a smooth, detailed part. Upon post-cure, tensile strength and stiffness exceeds that of injection-molded or 3D-printed ABS.

	METRIC ¹		IMPERIAL ¹		METHOD
	Green ²	Postcured ³	Green ²	Postcured ³	
Mechanical Properties					
Tensile Strength at Yield	38 MPa	65 MPa	5510 psi	9380 psi	ASTM D 638-10
Young's Modulus	1.6 GPa	2.8 GPa	234 ksi	402 ksi	ASTM D 638-10
Elongation at Failure	12 %	6.2 %	12 %	6.2 %	ASTM D 638-10
Flexural Modulus	1.25 GPa	2.2 GPa	181 ksi	320 ksi	ASTM C 790-10
Notched IZOD	16 J/m	25 J/m	0.3 ft-lbf/in	0.46 ft-lbf/in	ASTM D 256-10
Temperature Properties					
Heat deflection temp. @ 264 psi	42.7 °C	58.4 °C	108.9 °F	137.1 °F	ASTM D 648-07
Heat deflection temp. @ 66 psi	49.7 °C	73.1 °C	121.5 °F	163.6 °F	ASTM D 648-07

Notes:

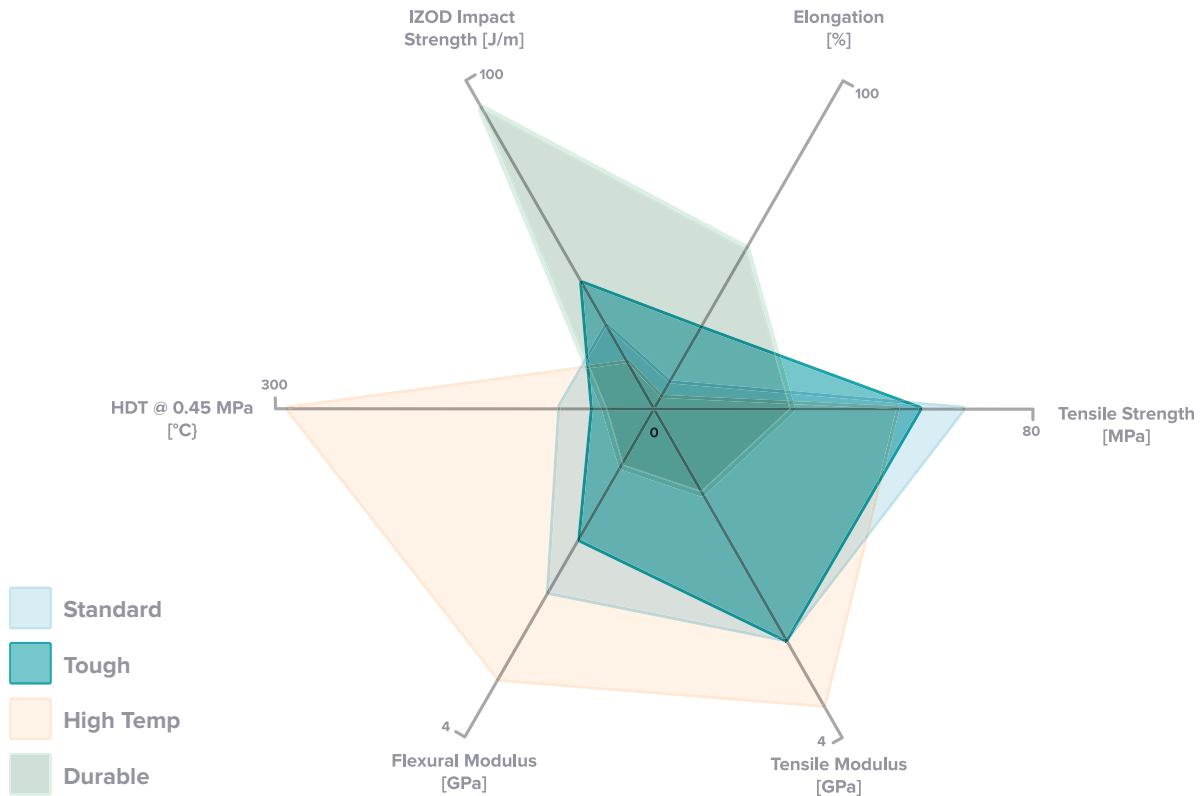
¹Material properties can vary with part geometry, print orientation, print settings and temperature.

²Data was obtained from green parts, printed using Form 2, 100 µm, Clear settings, without additional treatments.

³Data refers to post-cured properties obtained after exposing green parts to 1.25 mW/cm² of 405 nm light at 60 °C for 1 hour.



Formlabs Engineering Resins are designed to simulate a wide range of end-use materials. Compare mechanical properties to find the resins that best match your product requirements.



High-Performance Engineering Materials

Conceptualize, prototype, test, and manufacture with materials designed to simulate a wide range of end-use materials.

Agile Product Development from Prototype to Production

CONCEPT EXPLORATION

Elevate initial ideas with low-risk concept explorations that look like real products. From CAD to physical object in no time, rapidly develop, evaluate, and iterate a range of designs in-house.

RAPID PROTOTYPING

Looks-Like: Test design iterations and communicate ideas to stakeholders affordably and quickly.

Works-Like: Reliably develop proofs of concept and test functional prototypes with materials closely matching common injection-molded plastics.

Feels-Like: Simulate a range of materials from rubber to rigid, and create prototypes with the smooth finish and feel of end products.

PRE-PRODUCTION

Use advanced materials to design for manufacturability. Create small-batch runs or one-off custom solutions for comprehensive field and in-house testing before investing in expensive tooling for production.

PRODUCTION

With 3D printing, design doesn't have to end when production begins. Continuously improve products and respond quickly and effectively to issues on the line with jigs and fixtures that improve assembly or QA processes.

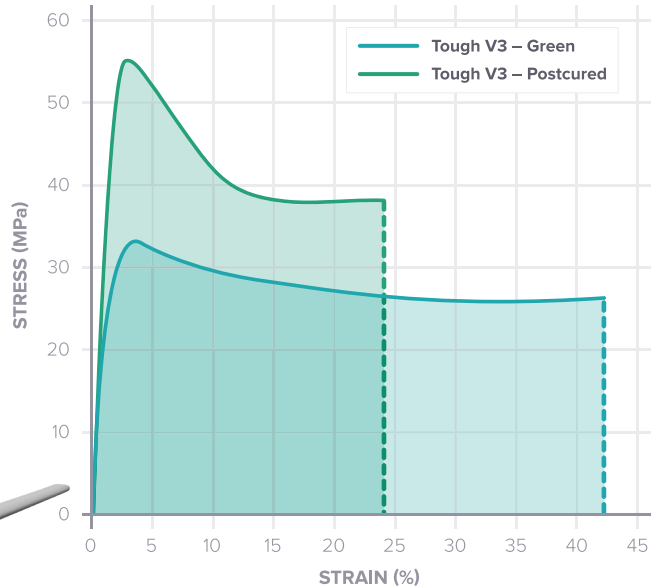


TOUGH

Tough was designed to simulate ABS plastic, with comparable tensile strength and modulus. Perfect for functional prototyping, this sturdy, shatter-resistant material has been developed to withstand high stress or strain.



Tough V3 – Tensile Stress-Strain Data



Tough Resin balances strength and elongation, making it the ideal choice for prototyping strong, functional parts and assemblies.

Note: To achieve desired durability, prints made with Tough Resin should be post-cured approximately 60 minutes at a 60°C temperature under a 405 nm wavelength light source.

TOUGH RESIN TECHNICAL DATA

Formlabs Tough Resin produces high quality prints that simulate ABS injection molded components while at room temperature and is specifically designed to work with your Form 2 or Form 1+ 3D Printer.

	METRIC ¹		IMPERIAL ¹		METHOD
	Green ²	Post-Cured ³	Green ²	Post-Cured ³	
Mechanical Properties					
Tensile Strength at Break	3.7 MPa	55.7 MPa	5040 psi	8080 psi	ASTM D 638-14
Young's Modulus	1.7 GPa	2.7 GPa	239 ksi	387 ksi	ASTM D 638-14
Elongation at Break	42 %	24 %	42 %	24 %	ASTM D 638-14
Flexural Strength at 5% Strain	20.8 MPa	60.6 MPa	3020 psi	8790 psi	ASTM D 790-15
Flexural Modulus	0.6 GPa	1.6 GPa	90.3 ksi	241 ksi	ASTM D 790-15
Notched Izod	32.6 J/m	38 J/m	0.61 ft-lbf/in	0.71 ft-lbf/in	ASTM D 256-10
Temperature Properties					
Heat Deflection Temp. @ 1.8 MPa	32.8 °C	45.9 °C	91.1 °F	114.6 °F	ASTM D 648-16
Heat Deflection Temp. @ 0.45 MPa	40.4 °C	48.5 °C	104.7 °F	119.3 °F	ASTM D 648-16
Thermal Expansion (23 – 50 °C)	159.7 µm/m/°C	119.4 µm/m/°C	88.7 µm/m/°F	66.3 µm/m/°F	ASTM E 831-13

Notes:

¹Material properties can vary with part geometry, print orientation, print settings, and temperature.

²Data was obtained from green parts, printed using Form 2, 100 µm, Tough settings, without additional treatments.

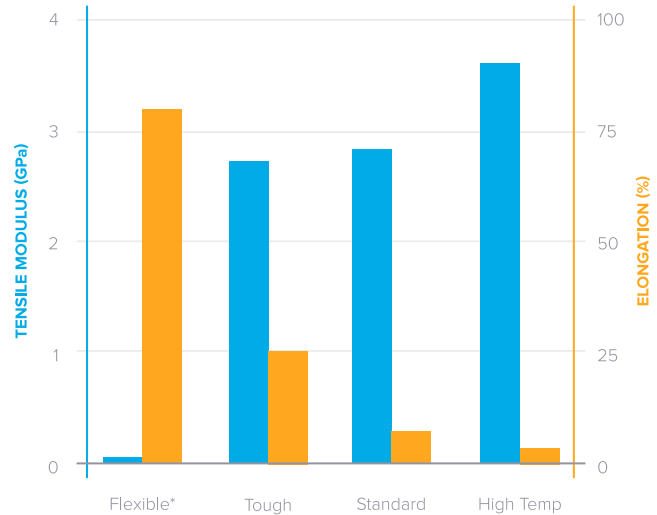
³Data refers to post-cured properties obtained after exposing green parts with 2.5 mW/cm² of 405nm LED light for 120 minutes at 60C.

FLEXIBLE

Flexible simulates an 80A durometer rubber. Use this versatile material to produce parts that need to bend and compress, especially over time. Flexible Resin is excellent for simulating soft-touch materials and adding ergonomic features to multi-material assemblies.



Elongation and Tensile Modulus



**Given the nature of these materials, Flexible data obtained from ASTM D 412-06 (A), all other data obtained from ASTM D 638-10*

Flexible Resin is a softer material, with a durometer of 80A, around that of rubbers used for shoe soles or tire treads. This more elastic material has a low tensile modulus and high elongation.

FLEXIBLE RESIN TECHNICAL DATA

Formlabs Flexible resin has elastomeric properties allowing you to print parts on the Formlabs 3D Printer that are bendable and compressible. Parts are pliable when thin and resilient when thick. Flexible has compression characteristics that make it great for creating parts like custom grips, stamps, gaskets and wearable prototypes. It does not shatter upon failure making it ideal for high impact applications.

	METRIC ¹		IMPERIAL ¹		METHOD
	Green	Postcured ²	Green	Postcured ²	
Mechanical Properties					
Tensile Strength ³	3.3 – 3.4 MPa	7.7 – 8.5 MPa	483 – 494 psi	1110 – 1230 psi	ASTM D 412-06 (A)
Elongation at Failure ³	60 %	75 – 85 %	60 %	75 – 85 %	ASTM D 412-06 (A)
Compression Set ⁴	0.40 %	0.40 %	0.40 %	0.40 %	ASTM D 395-03 (B)
Tear Strength ⁵	9.5 – 9.6 kN/m	13.3 – 14.1 kN/m	54 – 55 lbf/in	76 – 80 lbf/in	ASTM D 624-00
Shore Hardness	70 – 75 A	80 – 85 A	70 – 75 A	80 – 85 A	ASTM 2240
Thermal Properties					
Vicat Softening Point ⁶	231 °C	230 °C	448 °F	446 °F	ASTM D 1525-09

Notes:

¹Material properties can vary with part geometry, print orientation, print settings and temperature.

²Data was obtained from parts printed using Form 2, 100 um, Flexible settings and post-cured with 290 J/cm² of fluorescent bulb UV light, centered at 365 nm.

³Tensile testing was performed after 3+ hours at 23 °C, using a Die C dumbbell and 20 in/min cross head speed.

⁴Compression testing was performed at 23 °C after aging at 23 °C for 22 hours.

⁵Tear testing was performed after 3+ hours at 23 °C, using a Die C tear specimen and a 20 in/min cross head speed.

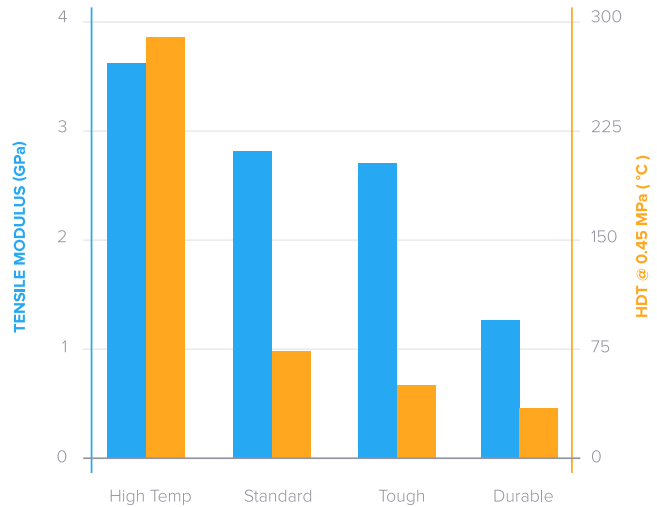
⁶Thermal testing was performed after 40+ hours with a 10 N loading at 50 °C/hour. Cracks formed in samples during testing.

HIGH TEMP

High Temp has an HDT of 289 °C @ 0.45 MPa — the highest on the 3D printing materials market. This material is great for static applications that will undergo higher temperatures. High Temp can also be used for production processes such as casting and thermoforming.



HDT @ 0.45MPa and Tensile Modulus



High Temp has the highest HDT @ 0.45MPa of all the Engineering Resins and of any 3D printing material on the market. High Temp has low thermal expansion and is also the stiffest Engineering Resin, with high tensile modulus.

HIGH TEMP RESIN TECHNICAL DATA

Formlabs High Temp Resin produces high temperature resistant plastic parts ideal for a wide variety of applications and is specifically designed to work with your Form 2 or Form 1+ 3D Printer.

	METRIC ¹		IMPERIAL ¹		METHOD
	Green ²	Post-Cured ³	Green ²	Post-Cured ²	
Mechanical Properties					
Tensile Strength at Break	33 MPa	51.1 MPa	4790 psi	7410 psi	ASTM D 638-14
Young's Modulus	1.5 GPa	3.6 Gpa	222 ksi	525 ksi	ASTM D 638-14
Elongation at Break	9 %	2 %	9 %	2 %	ASTM D 638-14
Flexural Strength at Break	41.2 MPa	106.9 MPa	5980 psi	15500 psi	ASTM D 790-15
Flexural Modulus	1.1 GPa	3.3 GPa	158 ksi	478 ksi	ASTM D 790-15
Notched IZOD	12.3 J/m	14 J/m	0.23 ft-lbf/in	0.26 ft-lbf/in	ASTM D 256-10
Water Absorbtion	N/A	0.21 %	N/A	0.21 %	ASTM D 570-98
Thermal Properties					
Heat Deflection Temp. @ 1.8 MPa	42.3 °C	130 °C	108.1 °F	266 °F	ASTM D 648-16
Heat Deflection Temp. @ 0.45 MPa	55.9 °C	289 °C	132.6 °F	552.2 °F	ASTM D 648-16
Thermal Expansion (0 – 150°C)	120.9 µm/m/°C	87.5 µm/m/°C	67.2 µin/in/°F	48.6 µin/in/°F	ASTM E 831-13

Notes:

¹ Material properties can vary with part geometry, print orientation, print settings and temperature.

² Data was obtained from green parts, printed using Form 2, 100 µm, High Temp settings, without additional treatments.

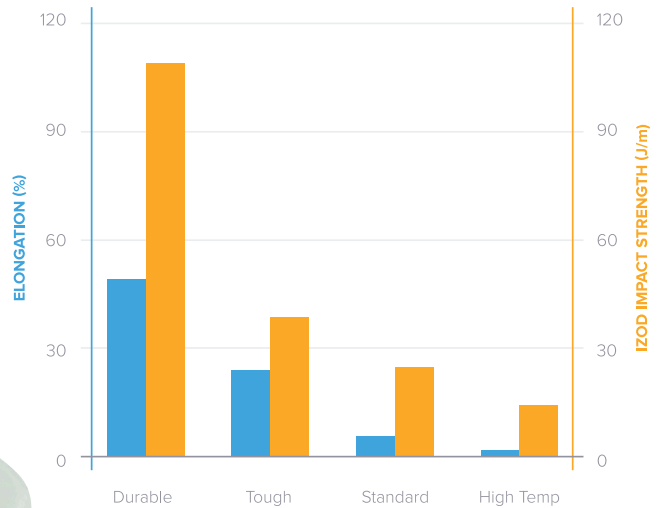
³ Data refers to post-cured properties obtained after exposing green parts with 290 J/cm² of fluorescent bulb UV light, centered at 365 nm.

DURABLE

Durable was designed to simulate polypropylene (PP) plastic, with comparable low modulus and high impact strength. Use this wear-resistant, ductile material when parts require deformation and a smooth, glossy finish.



Elongation and IZOD Impact Strength



Durable has the best impact strength of all the Engineering Resins and high elongation.

DURABLE RESIN TECHNICAL DATA

Durable was designed to simulate polypropylene (PP) plastic, with comparable low modulus and high impact strength. Use this wear-resistant, ductile material when parts require deformation and a smooth, glossy finish. For best mechanical properties, we recommend post-curing prints.

	METRIC ¹		IMPERIAL ¹		METHOD
	Green ²	Post-Cured ³	Green ²	Post-Cured ³	
Tensile Properties					
Tensile Strength at Yield	18.6 MPa	31.8 MPa	2.7 ksi	4.61 ksi	ASTM D 638-10
Tensile Modulus	0.45 GPa	1.26 GPa	65.7 ksi	183 ksi	ASTM D 638-10
Elongation	67 %	49 %	67 %	49 %	ASTM D 638-10
Flexural Properties					
Flexural Stress at 5% Strain	4.06 MPa	27.2 MPa	0.59 ksi	3.95 ksi	ASTM D 790-10, Procedure A
Flexural Modulus	0.16 GPa	0.82 GPa	23.4 ksi	119 ksi	ASTM D 790-10, Procedure A
Impact Properties					
IZOD Impact Strength	130.8 J/m	109 J/m	2.46 ft-lbf/in	2.05 ft-lbf/in	ASTM D 256-10, Test Method A
Temperature Properties					
Heat Deflection Temp. @ 0.45 MPa	< 30 °C	43.3 °C	< 86 °F	110 °F	ASTM D 648-07, Method B
Thermal Expansion from 23 to 50°C	117.0 μm/m/°C	145.1 μm/m/°C	65.0 μin/in/°F	80.6 μin/in/°F	ASTM E831-14

Notes:

¹ Material properties can vary with part geometry, print orientation, print settings, and temperature

² Data was obtained from green parts, printed using Form 2, 100 μm, Durable settings, without additional treatments.

³ Data refers to post-cured properties obtained after exposing green parts with 2.5 mW/cm² of 405 nm LED light for 120 minutes at 60°C.

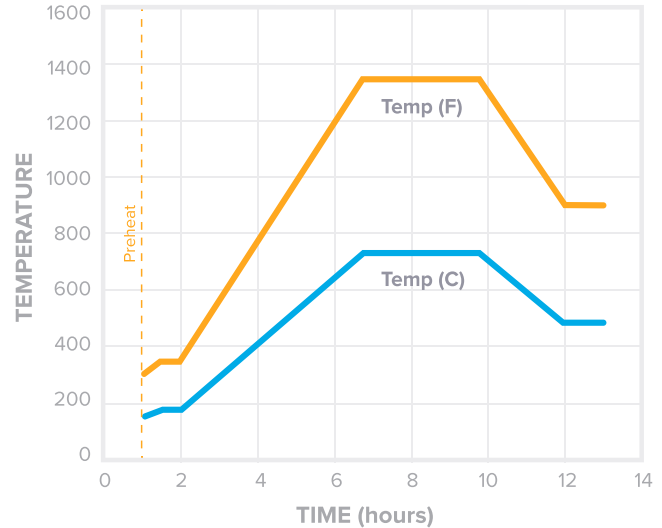
Jewelry

CASTABLE

Castable burns out cleanly, without ash or residue, perfect for capturing your high resolution prints through investment casting.



Recommended Burnout Curve



PROCESS

RAMP	300 °F/h	167 °C/h
CHANGE RAMP	300 °F	167 °C
RAMP	100 °F/h	56 °C/h
HOLD	350 °F, 30 min	177 °C, 30 min
RAMP	210 °F/h	117 °C/h
HOLD	1350 °F, 3 h	732 °C, 3 h
RAMP	-200 °F/h	-111 °C/h
HOLD	900 °F/h	482 °C, 1 h

RECOMMENDED INVESTMENT

R&R Plasticast with BANDUST

CASTABLE RESIN TECHNICAL DATA

With Castable Resin, you can produce detailed metal parts through the investment casting process. Developed specifically with investment casting in mind, the resin burns out cleanly with no ash or residue, making it perfect for jewelry, metalworking, and engineering applications. Castable Resin is optimized for the best burnout performance, but developing a specific burnout and casting process is up to you. Below, we provide guidelines that have proven to be successful during our testing process.

	METRIC	IMPERIAL	METHOD
Mechanical Properties¹			
Tensile Strength at Break	11.6 MPa	1680 psi	ASTM D 638-10
Young's Modulus	220 MPa	32 ksi	ASTM D 638-10
Elongation at Failure	13%	13%	ASTM D 638-10

Notes:

¹Data was obtained from parts printed using Form 2, Castable 50 µm Fine Detail settings and post-cured with 2.5 mW/cm² of fluorescent bulb UV light, centered at 405 nm

Dentistry




DENTAL SG

Dental SG is a Class 1 biocompatible resin (EN-ISO 10993-1:2009/AC:2010, USP Class V) designed to directly print surgical and pilot drill guides.

Accuracy Study

Print cost-effective guides without a trade-off in quality. A study of 84 printed guides demonstrated accuracy tolerances within ± 100 microns over 93% of the model surfaces.

ACCURACY OF PRINT TO 3D MODEL

-  +/- 50 microns
-  +/- 100 microns
-  +/- 200 microns



DENTAL SG TECHNICAL DATA

Formlabs Dental SG Resin produces strong, accurate, biocompatible parts ideal for a dental surgical guide and similar applications, and is specifically designed to work with your Form 2 3D Printer. After being post-cured, this material can be steam sterilized in an autoclave, or by gamma-ray sterilization. For more detailed information on handling and use, please see the Instructions for Use and the Safety Data Sheet.

	METRIC	METHOD
	Postcured	
Flexural Properties		
Flexural Strength	≥ 50 MPa	ISO 20795-1:2013
Flexural Modulus	≥ 1500 Mpa	ISO 20795-1:2013
Hardness Properties		
Hardness Shore D	≥ 80D	per ISO 868:2003
Impact Properties		
Charpy Impact Strength Unnotched	12 – 14 kg/m ²	ISO 179:2010

Dental SG is tested at NAMSA, Chasse sur Rhône in France, and is certified biocompatible per EN-ISO 10993-1:2009/AC:2010:

- Non-mutagenic.
- Non-cytotoxic.
- Not induce any erythema or edema reactions.
- Not a sensitizer.
- Not cause systemic toxicity.

The product is in compliance with ISO Standards:

- EN-ISO 20795-1:2013 (Dentistry – Base Polymers – Part 1: Denture Base Polymers)
- EN-ISO 7405:2009/A1:2013 (Dentistry – Evaluation of biocompatibility of medical devices used in dentistry)
- EN-ISO 10993-1:2009/AC:2010 (Biological evaluation of medical devices – Part 1 – Evaluation and testing)

Notes:

¹Material properties can vary with part geometry, print orientation, print settings and temperature.

²Data refers to post-cured properties obtained after exposing green parts to 108 watts each of Blue UV-A (315 – 400 nm) and UV-Blue (400 – 550 nm) light, in a heated environment at 60 °C (140 °F), with six (6) 18W/71 lamps (Dulux L Blue) and six (6) 18W/78 lamps (Dulux blue UV-A).

DENTAL MODEL





Designed for crown and bridge models with removable dies, Dental Model Resin is a high-precision, high-accuracy resin.

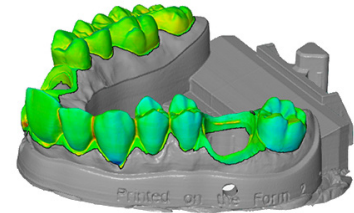


Accuracy Study

Margins, die surfaces, and contact points were found to be accurate within ± 35 microns of the digital model over 80 percent of surface points when printed on 25 micron print settings. Global accuracy across a full arch was found to be within ± 100 microns over 80 percent of the surfaces when printed at 25 or 50 microns.

ACCURACY OF PRINT TO 3D MODEL

-  +/- 0.08 mm
-  +/- 0.15 mm
-  +/- 0.23 mm
-  +/- 0.30 mm



DURABLE MODEL TECHNICAL DATA

Designed for crown and bridge models with removable dies, Dental Model Resin is a high-precision, high-accuracy resin. Print crisp margins and contacts within +/- 35 microns, and removable dies with consistently tight fit. Printed models have a smooth, matte surface finish and color similar to analog stone models.

	METRIC ¹		IMPERIAL ¹		METHOD
	Green ²	Post-Cured ³	Green ²	Post-Cured ³	
Tensile Properties					
Tensile Strength at Yield	33 MPa	61MPa	4800 psi	8820 psi	ASTM D 638-10
Young's Modulus	1.6 GPa	2.7 GPa	230 ksi	397 ksi	ASTM D 638-10
Elongation at Failure	25%	5%	25%	5%	ASTM D 638-10
Flexural Properties					
Flexural Modulus	0.95 MPa	2.5 GPa	138 ksi	365 ksi	ASTM D 790-10
Flexural Strain at 5%	33.9 MPa	95.8 MPa	4910 psi	13900 ksi	ASTM D 790-15
Impact Properties					
Notched IZOD	27 J/m	33 J/m	0.5 ft-lbf/in	0.6 ft-lbf/in	ASTM D 256-10
Temperature Properties					
Heat Deflection Temp. @ 264 psi	40.1 °C	55.9 °C	104.2 °F	132.6 °F	ASTM D 648-07
Heat Deflection Temp. @ 66 psi	47.5 °C	67 °C	117.5 °F	152.6 °F	ASTM 648-07

Notes:

¹Material properties can vary with part geometry, print orientation, print settings, and temperature

²Data Data was obtained from green parts, printed using Form 2, 100 µm, Dental Model settings, without additional treatments. Was IPA wiped rather than soaked.

³Data refers to post-cured properties obtained after exposing green parts to 1.25 mW/cm2 of 405 nm light at 60 °C for 1 hour.

“The Form 2 is, hands down, one of the most detailed and dimensionally accurate printers we’ve ever used. The resolution is so good, you can barely see layers. Fine details come through in ways that FDM printers can only dream of.”

—Drew Prindle, *digitaltrends.com* editor’s choice review.



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