

RAPIDNYLON®

Fully-Functional additive manufactured parts



Exclusively by Synergeering Group, LLC

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RapidNylon® prototype parts are additive manufacturing's leading functional prototype part, exclusively made by Synergeering Group, LLC. RapidNylon® parts mimic final injected thermoplastic parts better than any other additive manufactured part in the industry, allowing customers to better prove out designs.

RapidNylon® parts are produced with a highly modified LS process using a custom blended thermoplastic material, allowing parts to live in harsh, heated environments. Parts are also available with different post processing options making them more functional, air tight and impervious to chemicals.

Having a prototype part that actually works will allow designs to be proven out faster, reducing overall development costs.



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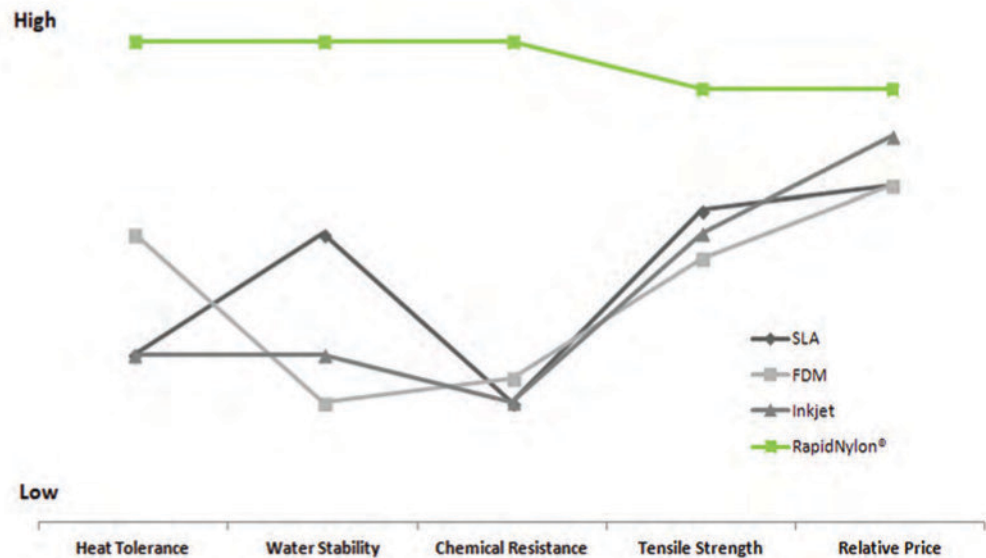




Additive Manufacturing Comparison



Where do we stand?



*Comparisons based on plastic materials most commonly used

*Relative price based on part-to-part comparison, which does not include nesting advantages.

*Comparisons based on RapidNylon® with post infiltration process.



RAPIDNYLON®
Technology

From
CAD
to part
in just
days.

RapidNylon® parts are produced directly from CAD models, using a highly developed and modified additive manufacturing process, called Laser Sintering (LS). This process uses a pair of CO₂ lasers to sinter cross sections of parts layer by layer, 0.15mm at a time. Parts are built on a descending platform within interchangeable build chambers. Un-sintered material surrounding each part acts as support to enable full utilization of builds and allow for complex geometries to be easily produced.

Synergeering was the first company in the United States to obtain an LS machine of it's kind. Today, Synergeering remains one of the largest privately owned LS service providers in the U.S. with 4 large frame LS machines.



One portion
parts up to
28" x 15" x 23"

Larger parts
are easily
produced
in portions

The Fleet:

4 - Modified large frame LS machines

Build chambers 28' x 15' x 23'

Smallest feature size 0.8mm

1 - High resolution LS machine

Build chambers 8' x 10' x 13'

Smallest feature size 0.5mm

Synergeering is seasoned at producing larger scale models in part due to their heavy machine modifications. Extremely large parts can either be produced as one piece, or in portions (bonded back together). Parts produced in portions are just as strong and accurate as if they were produced as one.





RAPIDNYLON® Material

Strength without compromising the accuracy

RapidNylon® parts are produced with a custom blend of GF-Nylon material that mimics injection molded plastic. This thermo-plastic material behaves just like a production run 30% GF Nylon 6 material.

- Glass-fill increases heat resistance
- Glass-fill maintains parts accuracy
- Parts live in temperatures up to 150°C (302°F)
- Material has comparable properties to injection molded 30% GF-Nylon 6 material
- Proven to be a viable replacement for aluminum components

Infiltration Process

With Synergeering's exclusive *post infiltration process*, RapidNylon® parts can perform in harsh environments. This post process infiltrates parts both inside and out to allow for parts to be:

- Impervious to fuels, oils, coolants, petroleum, etc.
- Air / pressure tight
- Withstand pressures over 11-bar (159 PSI), design dependent.

Functional Applications

- Intake manifolds
(active or non-active; single or multiple piece designs)
- Engine & valve covers
- Oil separators
- Fuel tanks
- Under-water components



RAPIDNYLON® Post Processes

Ancillary Components

With CAD data that's installation ready, we can directly install ancillary components:

- Threaded inserts
- Helicoils®
- Compression limiters
- Self-tapping screws

O-Rings and gaskets can also be bonded into parts for multiple piece designs.



Finishing Touches

Color

A complete “paint” job can also be done to RapidNylon® parts. This includes sanding for the smoothest surface finish possible (geometry dependent), priming and painting. Gloss, semi-gloss, and matte finishes are available.

Paint

RapidNylon® parts can be “colored” using a spray on Krylon® die, which is applied after parts are built. This is the fastest and most cost effective way to add color to your parts.





RAPIDNYLON® Applications

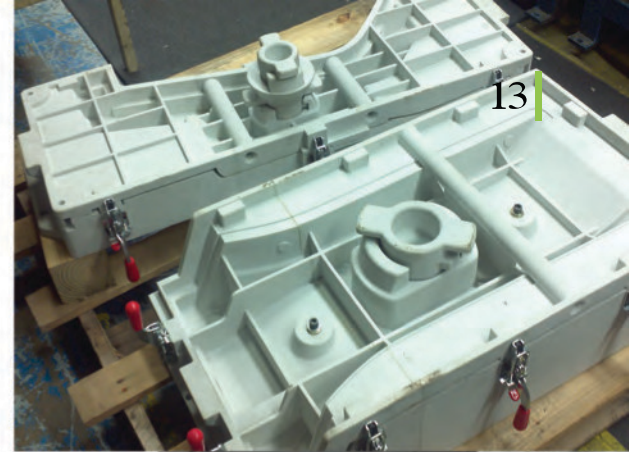


Automotive

- Full scale bumper fascias
- Exterior paneling
- Scale mock-up for tunnel test
- Full scale seats, trim, etc.
- Interior cockpit & add'l row
- HVAC

Engine Components

- Intake manifolds (passive & active)
- Oil pans & separators
- Fuel rails
- Radiator end-caps
- Beauty/engine covers
- Battery housings



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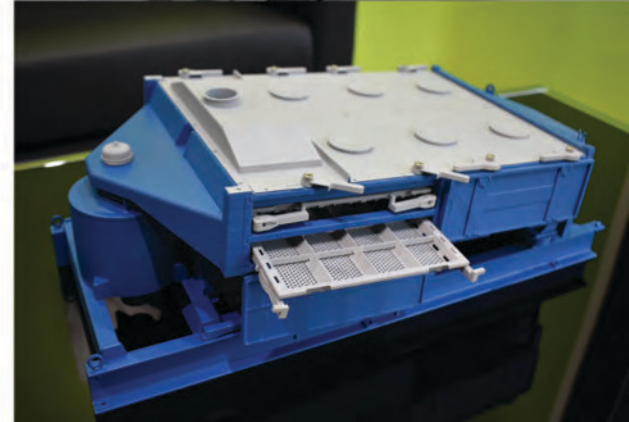
Manufacturing

- Details, fixtures & jigs
- Molds (material dependent)
- End-of-arm tooling



And More ...

- Off-road recreational vehicles
- Marine products
- Racing industries
- Underwater/deep sea products
- Robots
- Military
- Aerospace
- Medical tools, studies etc.
- Entertainment & art industry



Material Data

Material Properties

Density of laser sintered part (20°C)		ASTM D792	1.25 g/cc
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Mechanical Properties

Tensile Modulus		ASTM D638	3300 MPa
Tensile Strength		ASTM D638	45 MPa
Elongation at Break		ASTM D638	6%
Flextural Modulus		ASTM D790	3150 MPa
Izod-Impact Strength		ASTM 2256	20 KJ/m ²
Izod-Notched Impact Strength		ASTM 2256	4.1 KJ/m ²

Thermal Properties

Melting Point		DSC	184°C
DTUL, 0.45 MPa		ASTM D648	175°C
DTUL, 1.82 MPa		ASTM D648	110°C

Chemical Resistance

With post infiltration process

	Concentration [%]	Test Duration & Temperature	
		4 weeks/60°C	6 months/20°C
Acetic acid	10	++	-
Acetone (b.p. 56.3 °C)	100	++	++
Ammonia, aq	conc.	++	++
Aniline	100	+	-
Anti-freeze		++	+
Apple juice		++	++
Asphalt		++	++
Barium salts		++	++
Battery acid		±	--
Beer		++	
Benzene	100	++	±
Brake fluid		++	++
Butane, gaseous	100	++	++
Butane, liquid	100	++	
Butter		++	
Caustic potash	50	++	++
Caustic soda	50	++	++
Chlorine, liquid	100	--	--
Chrome plating solutions (commercial)		--	--
Chromic acid	20	--	--
Citric acid, aq.	c.s.	++	±
Coffee, ready for drinking		++	
Cyclohexanone	100	++	±
Detergent solutions ¹⁾	ready for use	++	++
Dibutyl phthalate (VESTINOL® C)		++	++
Diethyl ether (b.p. 35 °C)	100	+	-
Diocetyl phthalate (VESTINOL® AH)		++	++
Dishwashing agents	ready for use	++	++
Edible oils (animal or vegetable)		++	++
Ethyl acetate		++	-
Ethyl alcohol, not denatured	100	++	+
Fish		++	
Formic acid	10	++	++
Fuel oils	100	++	++
Glycerin	100	++	++
Glycol	100	++	++
Hydrochloric acid	10	--	--
Hydrofluoric acid	40	-	-
Hydrogen peroxide, aq	30	++	

Lactic acid, aq	10	+	±
Lemon juice		++	++
Linseed oil		++	++
Magnesium salts, aq		++	++
Methanol	100	++	+
Methyl ethyl ketone	100	++	±
Milk		++	++
Nitric acid	10	--	--
Ozone (0.5 ppm)		±	
Paraffin oil	100	++	++
Petrol		++	++
Petroleum	100	++	++
Potassium chlorate, aq	c.s. (7.3)	+	±
Potassium permanganate, aq	c.s. (6.4)	-	--
Propane, gaseous	100	++	++
Pyridine	100	++	
Rum	40	++	++
Sea water		++	++
Silicon oils		++	++
Sodium chloride, aq (common salt)	c.s.	++	++
Sodium hypochlorite, aq	5	+	-
Soft soap		++	++
Sugar solutions	any	++	++
Sulphur	100	++	++
Sulphuric acid	10	+	-
Toluene	100	++	-
Tomato juice		++	++
Trichloroethylene	100	±	-
Water	100	++	++
Whisky	40	++	
Xylene	100	++	±

Key to symbols:
Resistance levels
++ = resistant
+ = almost resistant
± = limited resistance
- = low resistance
-- = not resistant

Concentrations
aq = aqueous solution
c.s. = cold saturated
¹⁾ tested Dixan® and Persil®

A close-up photograph of an orange excavator arm. The arm features a large black grille with vertical slats. A green banner is overlaid on the lower portion of the image, containing white text. The background shows the mechanical components of the excavator, including a black tire and various metal parts.

**RAPIDNYLON® is changing
the way the world develops.**

Who we are

Synergeering Group, LLC operates in a 16,000-square foot facility located in Farmington Hills, Michigan (just minutes from most automotive OEMs and suppliers). The company was founded in 2001, where it initiated its placement in the industry with just one SLS machine. Since then, 4 additional LS machines have been acquired and Synergeering Group is now one of the only suppliers in the industry for large frame glass-filled nylon, laser sintered parts.

Synergeering was the first company to consistently produce single piece functioning intake manifolds to be used on the dyno for testing. This essentially changed the way that engineers and designers got through development and sped up the research process entirely. Synergeering continues this support throughout a diverse range of industries around the world, providing unrivaled fully-functional additive manufactured prototype parts with RapidNylon®.



ITAR/EAR compliant

Send your CAD

Via email or FTP access.

.STL or .STP file format preferred.

Identify quantity, timing & extra requirements.

Receive a Quote

Within hours. From a real person.

Cost is determined by the overall
size of parts together, post processes & timing.

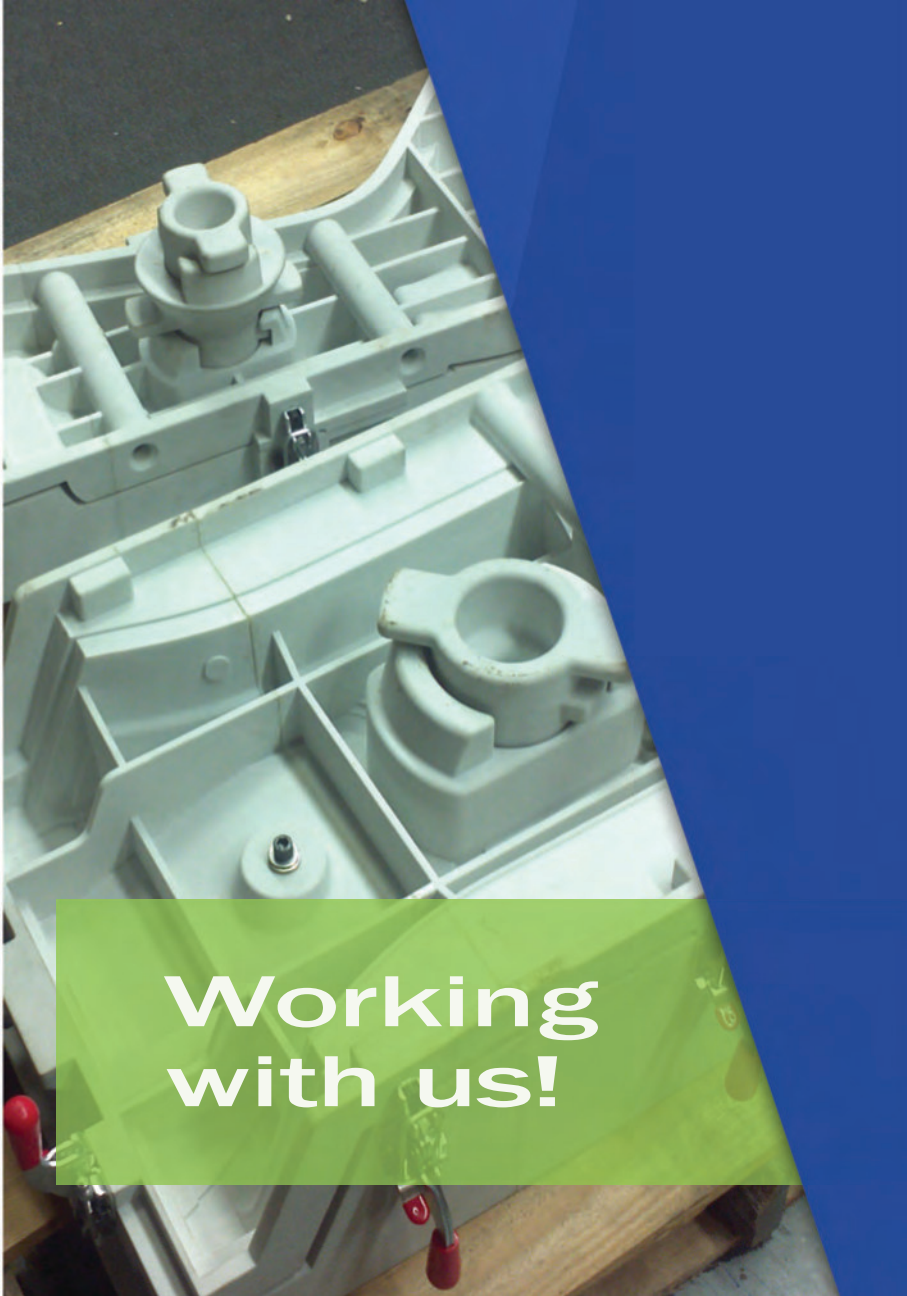
Give us the “Go”

We don't need a PO to GO. Send us an email
authorizing your project and your timing begins.

Parts Shipped in 4 - 8 days

Or sooner, just let us know.

Price for expedited parts is dependent
on size and current build schedule
at time of kick-off.



**Working
with us!**





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