



Proud U.S.A Based
Manufacturer



-lectrification Issue
Advanced Composites in Minutes,
not Hours or Days (after tooling).



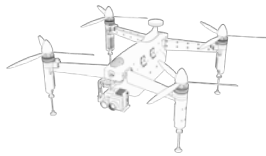
RAPID™
COMPOSITES

USA Only, Engineering & Advanced Manufacturing
of OEM/ODM Solutions.

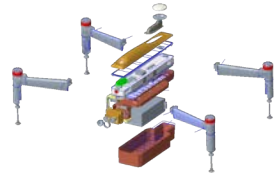


DESIGN TO PRODUCTION UNDER ONE ROOF

Phase I - Industrial Design



Phase II - Engineering



Phase III - Prototyping



Phase IV - Tooling



Phase V - Molding



Phase VI Trim & Paint

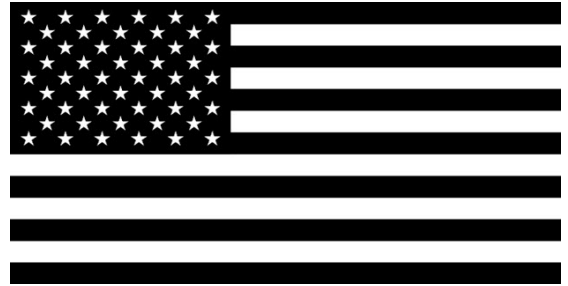


Phase VII Final Assembly



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Rapid Composites is a
Proud U.S.A. Based Supplier

IN HOUSE CAPABILITIES

Since 1999 Rapid Composites (Rapid) has been an established provider of engineering services with the skill, training, expertise and resources to take projects from concept through production. The team at Rapid, works on time, on budget and within the most exacting standards of precision and performance. Rapid offers a wide array of services including industrial design, mechanical engineering, electrical engineering, software engineering, prototyping, tooling, carbon fiber molding and production. Rapid specializes in developing products from the ground up and are capable of executing a “start to finish” process entirely under one roof.

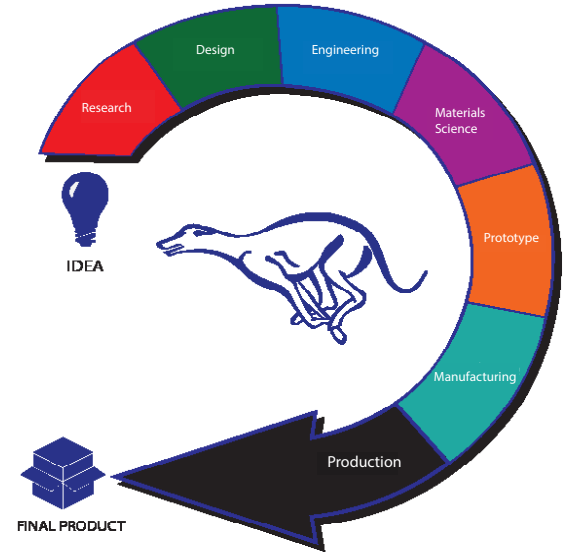


PROJECT MANAGEMENT

Rapid's Project Managers work with clients to:

- Define the scope of the project
- Create a project budget
- Prepare detailed schedules and task lists
- Business Plan Development

This process allows the team to manage its resources, ensuring that it's projects are completed within the defined scope, quality, time and cost constraints.



Rapid has the ability to go from napkin sketch to full production under one roof.



INDUSTRIAL DESIGN

Rapid's team of designers will bring your product to life utilizing rapid sketching and computer modeling. The team will illustrate various alternatives that can then be evaluated for aesthetics, functionality and ergonomics.

After choosing a concept, it's designers begin refining details within PTC Creo or Solidworks and then deliver photo realistic renderings of the 3D model(s). Still images and animations are often provided to give a realistic and accurate depiction of the product in its target environment. Full motion video of the concept is available upon request.



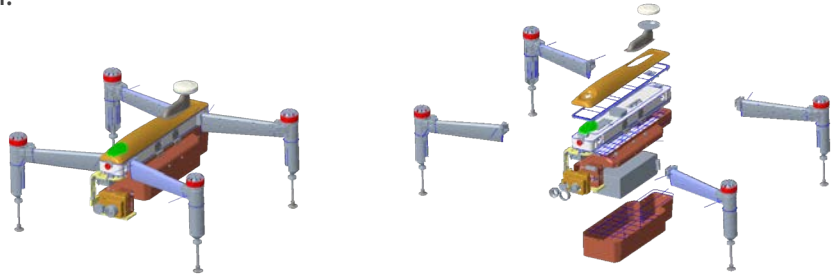


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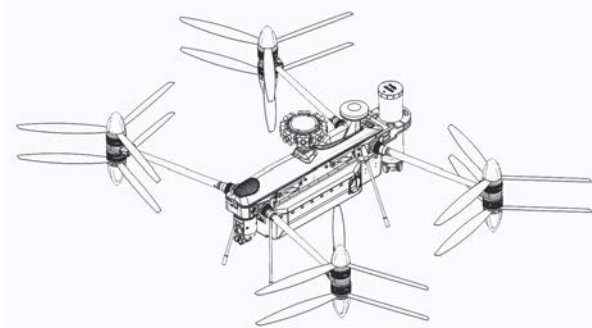


ENGINEERING

Rapid's ability to solve difficult challenges is in its DNA. This is the driving force behind what makes up diverse team of inventors, designers and engineers. With extensive engineering capabilities under one roof, the team can bring almost any product to fruition.



MECHANICAL ENGINEERING



LF-4e VTOL UAS

Rapid's highly trained staff of mechanical engineers has extensive experience working with PTC Creo and Solidworks 3-D modeling software. At Rapid there are no walls within our design/engineering studio in order to facilitate a collaborative environment. This enables Rapid's team to take product's from concept to production in a synchronized effort.



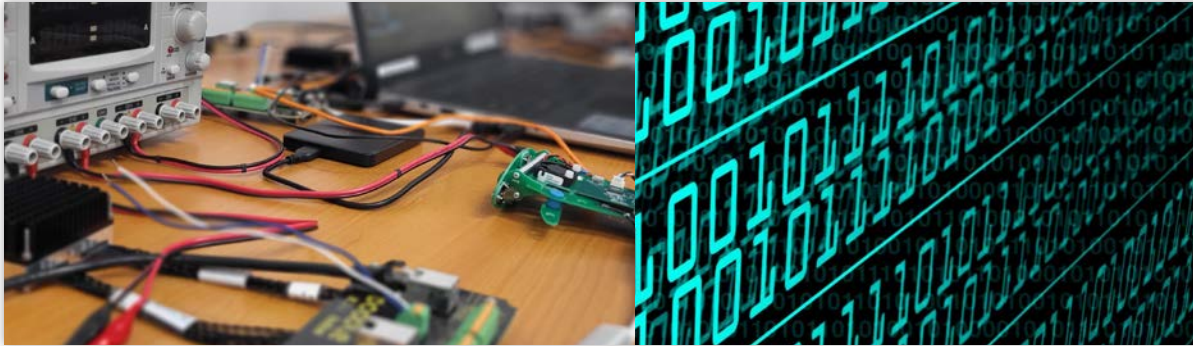
ELECTRICAL ENGINEERING

Rapid's electrical engineering capabilities include:

- System architecture for embedded systems
- Schematic capture
- PCB layout and routing to include, high speed digital and multi-layer designs
- Testing and debugging
- Micro-controller firmware
- CPLA/FPGA programming
- Power supply design
- Membrane keypad design
- Operating system configuration and integration
- Support for Windows and IOS platforms
- PLC system development and programming



SOFTWARE ENGINEERING



In addition to Rapid's electrical engineering capabilities, the team also has the ability to work with embedded programming for micro-controllers and PC BIOS customization. The team can also develop utility applications for Windows based systems.

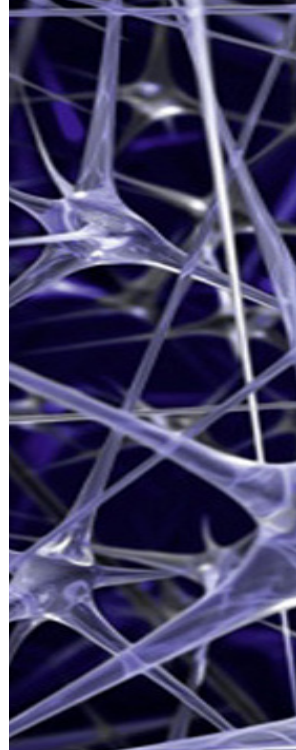
MATERIALS SCIENCE

Rapid has materials that are up to two times more thermally and electrically conductive than copper. Conversely, the team also works with dielectric and radiolucent materials. There are thousands of options and combinations available.

Automated molds are made from aluminum or steel depending primarily on processing temperature and pressure requirements. Aluminum and steel tooling has shot lives of up to 500 and 25,000, respectively. These molds often cost 60% to 70% less than conventional processes like injection molding or die-casting.

Areas of Focus:

- Thermoplastic Composites
- EMI/RFI Shielding
- Thermally Conductive Materials
- Non-Conductive Materials
- Rapid Cure Composites
- Compounding/Hybridization
- Continuous Fiber Molding
- Combined Thermally Conductive & Dielectric



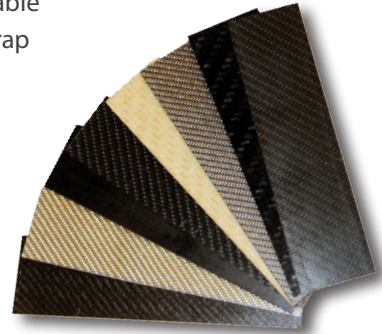
THERMOPLASTIC COMPOSITES

Compared to Metals:

- High Strength/Stiffness, Toughness
- Reduced Weight
- Low Coefficient of Thermal Expansion (CTE)
- Inherent Corrosion and Chemical Resistance
- Increased Part Function via Part Consolidation
- Reduced Secondary Operations
- Styling Freedom/Contoured Shapes
- Inexpensive Tooling

Compared to Thermoset Composites:

- No Need For Controlled Storage/Unlimited Shelf Life
- Significantly Faster Cycle Times (lower mfg. cost)
- Environmentally Sound and Recyclable
- Can be Re-processed – Reduced Scrap
- Superior Toughness



Standard Polymers: TPU • PC • PET • PET-G • PA-11, 12, 6, 6/6 • PBT • ULTEM • PPS • PEI • PEEK • PEK • LCP

EMI/RFI SHIELDING

Rapid can incorporate precision-expanded metals, foils and non-woven fabrics to meet a customer's exact requirements for shielding, electrical conductivity and thermal transfer properties. Its insitu-laminated shielding materials can be incorporated into a thermoplastic or thermoset matrix, providing superior performance that does not flake off with time. This is an effective shield against EMI/RFI emissions. Formed from sheet metal or non-woven fabric, the shape, pattern and open areas are engineered to match the needs of a particular application. More than 35 different metals can be custom expanded to shield against specific wavelength spectrums. They can even be laminated, coated and plated. Rapid offers some of the only composite structures capable of being soldered.

Rapid's experience further extends into co-laminated, dielectrically insulated foils, bus-bar and flexible PCB's acting as conductive traces, whereby, eliminating point-to-point wiring connections. These materials wrap and conform to almost any shape. Designers are free to be creative with complex, surfaced geometry.

Notable Advantages:

- High Electrical Conductivity
- High Thermal Conductivity



Expanded Metal Fabric



CF / Copper Foil

Expanded metal options that can be co-molded into composite materials include the following:

Al 1145
Al 3003
Al 1100
Brass 260
Brass 70-30
Brass 80-20
Brass 85-15
Bronze 90
Cadmium

Copper
Gold
Hastelloy X
Haynes 214
Inconell 600
Iron
Lead
Magnesium
Molybdenum

Ni 201
Nickel
Ni 899L
Niobium
Palladium
Platinum
Platinum Clad Niobium
Silver

SS 304L
SS 316L
SS 444
Steel 1008
Tantalum
Titanium
Zinc 500
Zirconium

EMI/RFI Shielding Examples

CF / Copper Expanded Metal



CF / Aluminum Expanded Metal



CF / Copper Expanded Metal



CF / Nickel Plated Non-Woven / GF



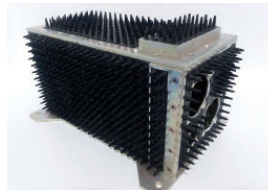
THERMALLY CONDUCTIVE MATERIALS

Rapid has the ability to design, tool, mold and safely post-process machine, advanced thermally conductive components for a wide range of industries. It's battle proven solutions operate in the most extreme environments.

Rapid has years of experience working with thermally conductive PITCH-based crystalline carbon fabrics, braids, chops and milled fibers. These materials are produced in a wide range of styles and are even available in unidirectional, biaxial and tri-axial forms. PITCH fabrics can be processed into composites for a variety of thermal and CTE-critical applications that require exceptional fatigue and frictional properties. These materials can be infiltrated with metals or polymers for optimized thermal and mechanical properties.



PITCH Fiber/Aluminum and Copper Heat Sinks

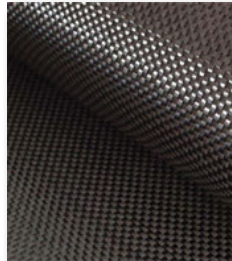


Pin-Fin Enclosures



Pin-Fin & Aerodynamic Blade-Fin
PITCH Fiber Heat Sinks

Thermally Conductive Examples



3K 2x2 Twill Pitch CF



3K 2x2 Twill Pitch CF Consolidated



12K Pitch CF Yarn



1/2" Chopped Pitch CF



300-300 X 10 Microns Milled Pitch CF



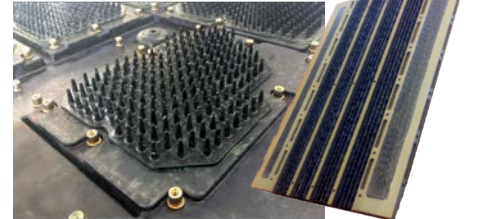
2" Chopped Pitch CF

Thermally conductive discontinuous fibers are available in a free-flowing form that can be easily blended and compounded with most other materials. Many of the materials utilized have a longitudinal thermal conductivity more than two times higher than copper at 900 W/mK, and a tensile modulus greater than 120 msi. Chopped fibers are also available in 1/2" to 4" lengths with a thermal conductivity of 350 W/mK to 900 W/mK varying by grade. These materials can also be mixed as slurry or isotropically oriented fibers, ensuring that conductivity will be equal in any direction.

Notable Advantages:

- Zero CTE
- High Thermal Conductivity
- High Electrical Conductivity
- Excellent Impact Resistance

Bonded PITCH Fiber Heat Sinks



NON-CONDUCTIVE MATERIALS

A great deal of emphasis is put on increasing the thermal and electrical conductivity while reducing weight. Conversely, the team is often asked to design components that require dielectric or radiolucent properties. There are many suitable thermoplastic and thermoset composite materials available in both continuous and chopped fiber.

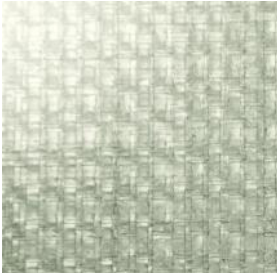
Rapid, routinely utilizes Glass materials for radome and antenna applications. Quartz-glass and Phenolic-based composites are often used for radiolucent applications. Many of the fabrics and chopped fiber can be molded with PPS or PEEK to provide superior temperature resistance and increased impact strength.



Notable Advantages:

- Low CTE
- Low Dielectric Constants of 2.5 or less can be achieved
- Thermal Insulating Properties
- Excellent Impact Resistance

Non-Conductive Material Examples



Quartz, E, D, R and S-Glass
Thermoplastic and Thermoset
Fabrics



Kevlar/PA-12
Thermoplastic Fabric



E-Glass/PP
Uni-Directional Tape



E-Glass/Kevlar
Molded Radome Example

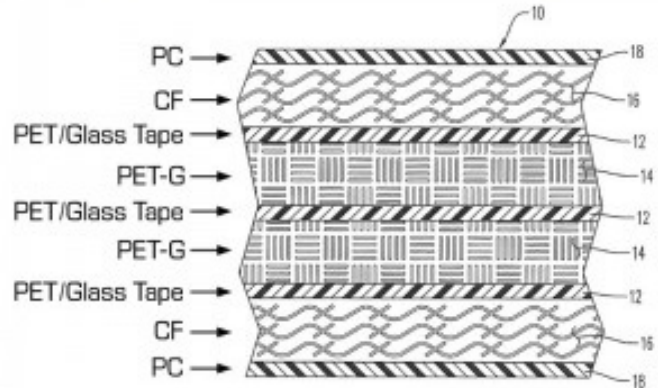


COMPOUNDING & HYBRIDIZATION

Rapid has the ability to combine materials in unique custom ways to meet the most challenging demands.

- Polymerization Research
- Hybrid Development
- Compounding
- Hydrocarbon-Chain Modification
- Consolidation

Example of a Pre-Consolidated Hybrid Thermoplastic Composite Solution



TESTING

Mechanical:

- FEA
- CFD
- Tensile
- Fatigue
- Compression testing
- Open hole tension and compression
- In-plane shear
- Inter-laminar shear
- Drop weight impacting
- Shake table testing

Environmental Tests:

- Temperature/humidity conditioning
- Fluid immersion

Physical Tests

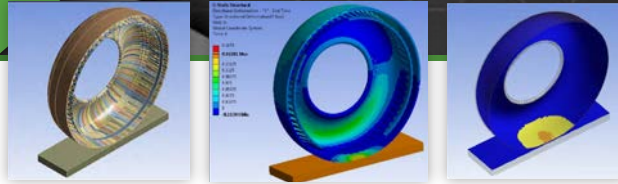
- Fiber Volume Fraction – Glass (Burn-off)
- Fiber Volume Fraction – Carbon (Acid Digestion)

Thermal Tests

- Glass Transition Temperature (T_g)
by means of a Dynamic Mechanical Analyzer (DMA)

Routinely Supported Certifications:

- UL, CE, NSF, FCC, IP, i-Safe, MIL-810, 461, 901D



Non-Pneumatic
Composite Off-Road
Tire



A: Static Structural (ANSYS)
Total Deformation
Type: Total Deformation
Unit: m
Time: 1
10/10/2011 7:41 PM

1.0145e-6 Max
9.0179e-7
7.8907e-7
6.7634e-7
5.6362e-7
4.5089e-7
3.3817e-7
2.2545e-7
1.1272e-7
0

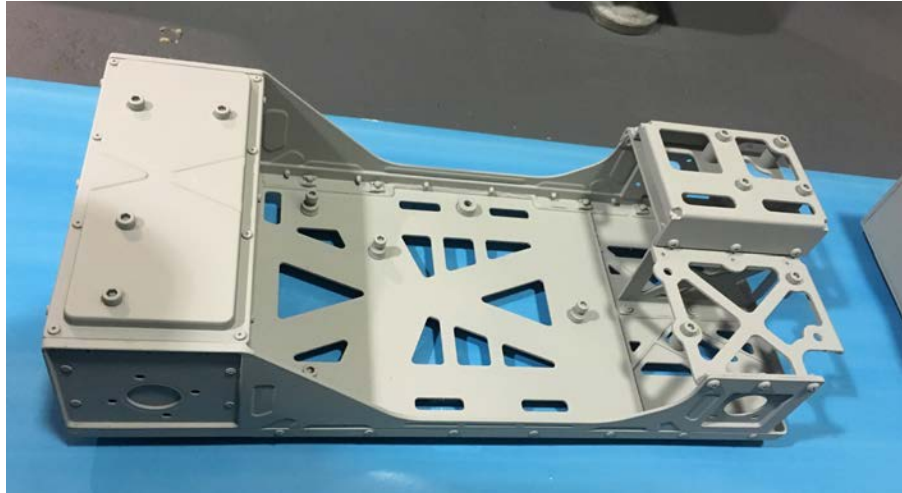
RAPID PROTOTYPING

In order to ensure the functionality of a design prior to production, Rapid provides it's clients with high-quality prototypes. Rapid uses a combination of solutions to include; fused deposition modeling (FDM), selective laser sintering (SLS), stereolithography apparatus (SLA), RTV molding, CNC machining and many others.

It's Team of designers and engineers work together to model, print, program, machine and assemble your prototype, all under one roof. Prototypes can be post-processed with Class-A surfaces, ultrasonically welded, epoxy bonded, painted, screen printed and even fiber reinforced to mimic a composite structure.



IN-HOUSE WET PAINTING



Rapid Composites specializes in fabricating highly complex and precision rapid prototypes that can even fly! Rapid's proprietary reinforcing techniques are second to none. Prototypes can be tested with actual hardware allowing it's team to identify problem areas before entering into tooling and production phases.



MANUFACTURING

Rapid's ability to take a product from engineering to production under one roof, ensures it can effectively manage and control the schedule. It's engineers provide continuous oversight and guidance throughout all aspects of a production build, guaranteeing that any issues are resolved in the most expeditious way.



Precision Epoxy Bonding Fixture



P-20 Optical Mold Cavity



Aluminum e-Foil Surfboard Mold



P-20 sUAS Molds

PARTIAL FACTORY FLOOR AT RAPID COMPOSITES



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All Products are Patented or Patent Pending

CNC MACHINING

Rapid's full range of precision in-house machining to include:

- Mold Making
- Prototyping
- Short-Run
- Production Machining



HAAS GR 510- CUSTOM

X Y Z
120" 60" 24"



HAAS VF 8

X Y Z
64" 40" 30"



HAAS VF 4 SS

X Y Z
50" 20" 25"



DMG MORI 2500 | 700

Max Turn Diameter 18.1"
Max Turn Length 28.6"
Sub-Spindle
Y-Axis
Live-Tooling

Large Scale Aluminum Molds



CONTINUOUS FIBER MOLDING

Benefits:

Continuous fiber combined with a thermoplastic matrix such as nylon, makes for an extremely stiff, damage tolerant and lightweight structural composite part. A comparable part in machined aluminum would weigh 40-50% more. In addition to the high strength to weight ratio, they also have very good electrical conductivity and extremely low coefficients of thermal expansion. This simplifies tolerance issues for devices such as optical benches that would be affected by movement of a cover. It also simplifies many thermal management problems. Ballistic grade materials can also be molded such as; Kevlar, Spectra Fiber, Dyneema and Innegra Fiber.



How It Works:

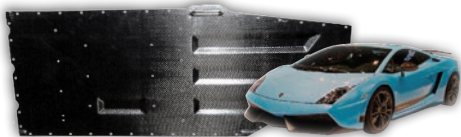
The continuous fiber thermoplastic composites are made through a melt and compression molding process, contrasting with conventional thermoset composites that rely on solvent-based chemistry and complicated cure schedules. Many of these materials can be molded in low cost aluminum molds; some higher temperature materials may require steel. Thermoplastics are extremely fast when compared to thermosets, averaging three minutes per part.

Recent Developments:

Rapid has pioneered new methods allowing pre-consolidated materials to be rapidly heated, then shuttled to a mold and hot stamped in under 45 seconds to the net-shape of a part. **This is presently... the fastest continuous fiber molding process in the world.**

Example:

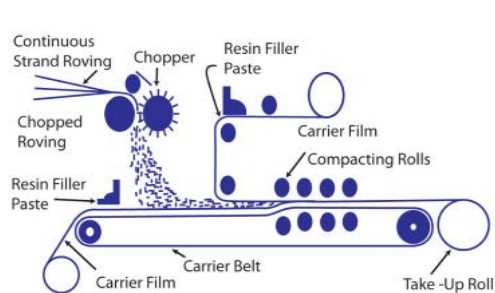
Lamborghini Gallardo and Audi R8 Floorboards...
The Original Mold Time was 2.5 to 3 Hours.
Now, its Only 2.2 Minutes from Start to Finish



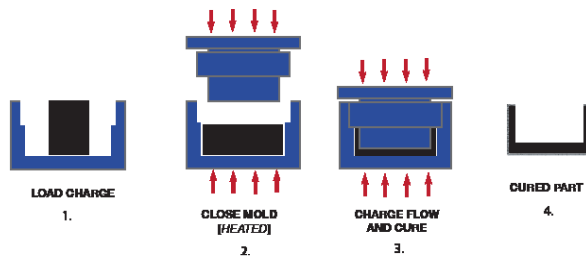
THERMOSET RAPID CURE COMPOSITES

Rapid routinely helps its clients identify the best materials and processing techniques. Fast-cure discontinuous composites may be a solution for parts with substantial variation in thickness and/or significant cost sensitivity.

The Discontinuous carbon structure offers high-speed thermoset cycle-times with the ability to conform by dispersion, within a shear style mold. There is a near zero scrap-rate when using these materials.



Process Example



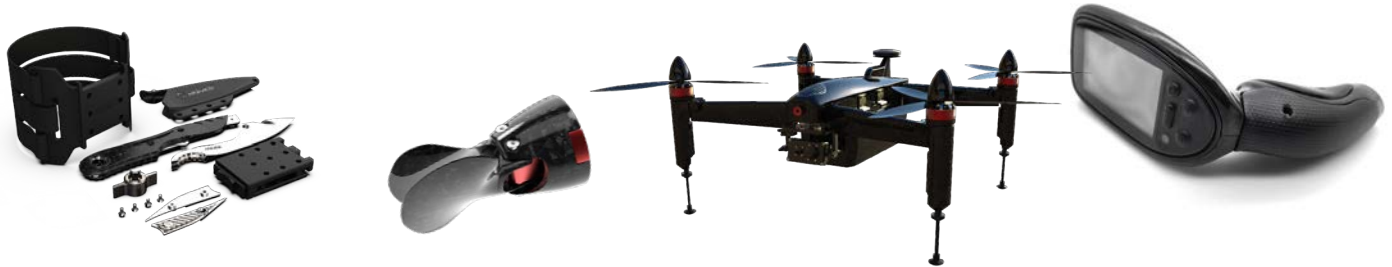
Discontinuous Carbon Example





NEW PRODUCT EXAMPLES

Rapid Composites has a diverse portfolio of clients which represent many unique challenges. This team takes great pride in manufacturing quality products to the most exacting standards and attention to detail.



CF 2U Rack Mount Computer



CF PITCH Fiber Pin-Fin ATR Chassis



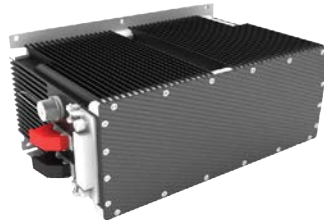
Track Robot



CF Rack Mount Transit Case



CF PITCH Fiber Bonded-Fin ATR Chassis



CF Robot Head Sensor Unit



MILITARY & LAW ENFORCEMENT DRONES

eZ-Kill™ sUAS Loitering Munition



BR-Mb™ Commercial sUAS



LF-3b Amphibious Lungfish™ sUAS



BR- H4c Bullray™ sUAS (1.82m)



BR-H4f Bullray™ sUAS (3m)



LF-5b Lungfish™ Commercial sUAS



CF Flyaway SATCOM Positioner



CF LWTS Scope



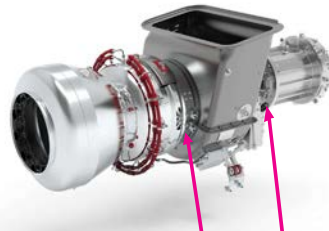
CF Biocular Controller



CF Man-Portable SATCOM System



Turbine Hybrid Generator (Ducts Only)



Non-Conductive Composite Ducts

Thermal Gimbal Controller (Helicopter)



MILITARY TABLETS & OPTICAL DEVICES

CF HandHeld Tablet PC



CF Marine Tablet PC



CF MRT Tablet



CF Ambidextrous Robot Controller



CF Thermal Biocular Display



Thermal System



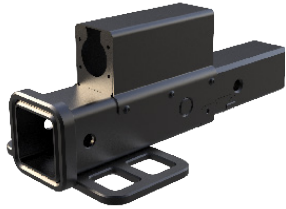
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12" CNC Hitch Extender



Rattlesnake™ Quick-Attach Crane System



Rattlesnake™ Generator Mount



Thermal Scanning Device



Electronic Flight Bag (EFB)



Fiberoptic Analytical System



CONSUMER ELECTRONICS & OTHER HARDWARE

CF Automotive Themed Travel



Lithium Battery Transit Case



CF CLAD™ Case



CF Headphones



Fireproof Lithium Battery Case



Non-Pneumatic, All Composite & Inductively Welded Tire-Carcass



CF- Hand Controller



Click-Lock For Propellers & Rotors



Computer Mounting Solutions



CF-Earbuds



e-Foil Boards, Electronics & Accessories



Shadefin™ For Sport Fishing Boats



LUXURY CONSUMER HARDWARE



CLAD™ Case products are built for a discerning buyer who expects nothing but the best. These briefcases are fabricated from the most aesthetic carbon fiber, CNC machined aluminum and fine leather. They even boast cartridge bearings at moving joints and gas strut openers. CLAD™ can custom match both the interior and exterior to a favorite exotic car or private jet.



CUSTOM MEMBRANE KEYPADS



RUGGED MECHANISMS & FASTENING SYSTEMS

Rapid has developed a wide array of rugged and reliable Patent Pending cam-latches, click-lock, articulating joints, mounting solutions, custom fasteners and handle mechanisms. Rapid's team strives to offer simple, elegant and easy to operate products that sets it apart from competitors.

Custom Telescoping Grab Handles



Click-Lock & Latch Mechanisms



Fastener Systems



CUSTOM PROCESSING EQUIPMENT

Rapid designs and builds custom equipment used for high-speed processing of thermoplastic and thermoset composite materials. Rapid also offers engineering services for the development of fully automated work-cells with worldwide delivery and technical support.



Custom, Fully Automated Composite Shuttle, Thermoplastic Heater and Press Systems up to 600A, 480V, 3/PHASE.



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COMPOSITES



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