

RP TEMPERING™ TECHNOLOGY NEWS



NANO-COMPOSITE
TECHNOLOGY

SOLID FREEFORM ADDITIVE TECHNOLOGY &
PATENTED ENGINEERING TECHNIQUE

Volume 44
January 2012

RP Tempering™ Product Guide Issue

Happy New Year from MBD Sales and RP Tempering™ Products. We are coming off a records sales year for RP Tempering™ Product. More and more companies globally are using RP Tempering™ Products. If you order products in January we will cover the shipping charges for shipments anywhere in the USA or Canada. For anyone in Europe please contact Alphacam our RP Tempering™ distributor. Contact Baran Dag at Baran.dag@temperman.com or Jana Jancke at jjancke@alphacam.de.

In this issue of the RP Tempering™ News you will find a quick view list of all our products. This would be a good quick source for you to print out for a quick reference when considering or explain RP Tempering™. Different RP Tempering™ products can enhance Mechanical Properties, Electrical Properties, Chemical/Environmental Properties and Thermal Properties. MBD Sales will temper sample parts with any of our products at no charge. The sample parts can be made out of any type of prototype material, plastic or other materials. Just send the parts to Manufacturing by Design, Inc., 10816 Preston Drive, Indianapolis, IN 46236. Please send instructions explaining which RP Tempering™ material(s) you want us to use. RP Tempering™ products include:

- Proto-Plasma™ Coating
- RP Tempering™ Compound Coating
- Proto-Reinforcement® Infiltrate Coating
- Hi-Temp Protoplass® Coating
- Fire Retardant Protoplass® Coating
- EMI Shielding Spray
- RFI Shielding Spray
- InsulTemp® Spray Coating
- LubeTemp® Spray Coating (FDA Food Grade)
- LubeTemp® Spray Coating (Industrial Grade)
- RF C13® Absorb Coating Kit
- RadiationTemp® Coating Kit
- Injection Applicators
- Easy Spray Handle Device
- Tempering Parts for Customer – Service
- Engineering Services
- Rapid Tooling Services
- CNC Machine Services



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- 2] Proto-Plasma-Rx
- 3] RP Tempering Compound
- 4] Proto-Reinforcement
- 5] Hi-Temp Protoplass®
- 6] Fire Retardant Protoplass
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- 9] LubeTemp® Spray
- 10] InsulTemp® Spray
- 11] RF C13 Carbon Absorb®
- 12] RadiationTemp®

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Proto-Plasma™ Coating

Proto-Plasma™ spray comes in 11oz cans and is available in colors to include: clear, black, red, yellow, blue and white. One can will cover 1600" square inches of part surface area. Proto-Plasma can be used by it's self or in combination with Proto-Reinforcement© Infiltrate and/or RP Tempering™ Compound to achieve different levels of enhancing mechanical properties and/or environmental/chemical resistant properties.



Proto-Plasma by its self or in combination can enhance Mechanical Properties to include: Impact Strength, ¼ Point Flex, Flexural Modulus & Torsion Durability. Enhance Environmental/Chemical Resistance Properties to include: Chemical Resistance, Water Tight, Resist Moisture/Humidity & Seals Porosity. Enhance Thermal Properties. Enhance Thermal Properties to include: Insulates against High Heat or Extreme Cold. Visit the www.RPTempering.com website to read more application articles, data sheets and test data.

Proto-Plasma™ Application Examples:



SLA GF Nylon Electrical Junction Box for outside cable application with fully functional living hinge. Actual clasp snap feature to lock and unlock with functional one way snap features.



SLA Bottles to hold Chemical Reagent. Lids were tightened down and chemical do not leak or sweat after two months of life cycle fatigue test.



SLA GF Nylon fully functional Weed Eater assembly. Several of these newly designed Weed Eaters were made for a trade show to demonstrate functionality to potential customer. Every assembly work the entire show without breaking.



FDM Pump Housing for fuel application.



SLA fully functional pop design living Hinge picture on left for medical application. Standard living hinge pictured on right.



SLA fully functional squeezable bottle for mustard. This bottle passed the life cycle fatigue test in ambient and refrigerated temperature when squeezing out mustard and holding the fluids.

RP Tempering™ Compound

RP Tempering™ Compound is available in 2oz jars, 8oz jars, 1 gallon cans, 5 gallon cans and 50 gallon drums. Available colors are listed below. An 8oz jar covers 1200" inches of part surface area. RP Tempering™ can be used by it's self or in combination with Proto-Reinforcement© Infiltrate and/or Proto-Plasma™ Coating to achieve different levels of enhancing mechanical properties and/or environmental/chemical resistant properties.



RP Tempering™ by its self or in combination can enhance Mechanical Properties to include: Impact Strength, ¼ Point Flex, Flexural Modulus & Torsion Durability. Enhance Environmental/Chemical Resistance Properties to include: Chemical Resistance, Water Tight, Resist Moisture/Humidity & Seals Porosity. Enhance Thermal Properties. Enhance Thermal Properties to include: Insulates against High Heat or Extreme Cold. Visit the www.RPTempering.com website to read more application articles, data sheets and test data.

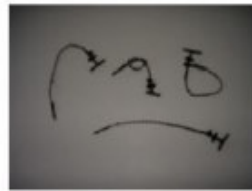
RP Tempering™ Application Examples:



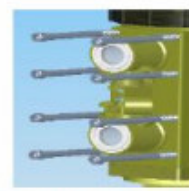
FDM ABS Pump Housing for weed control chemical had to be fully functional with 175psi vacuum pressure.



FDM Under Hood Automotive application for break fluid under 110psi had to pass a test and could not leak.



SLA .030 diameter fully functional wire ties.



SLS fully functional Screw boss passed 200 time life cycle Test with screws.

Proto-Reinforcement® Infiltrate Coating

Proto-Reinforcement® Infiltrate Coating is available in 2oz jars, 8oz jars, 1 gallon cans, 5 gallon cans and 50 gallon drums. Available only in clear color. An 8oz jar covers 1600" inches of part surface area. Proto-Reinforcement® Infiltrate Coating can be used by it's self or in combination with RP tempering™ Compound and/or Proto-Plasma™ Coating to achieve different levels of enhancing mechanical properties and/or environmental/chemical resistant properties.

Proto-Reinforcement® Infiltrate Coating by its self or in combination can enhance Mechanical Properties to include: Impact Strength, ¼ Point Flex, Flexural Modulus & Torsion Durability. Enhance Environmental/Chemical Resistance Properties to include: Chemical Resistance, Water Tight, Resist Moisture/Humidity & Seals Porosity. Enhance Thermal Properties. Enhance Thermal Properties to include: Insulates against High Heat or Extreme Cold. Visit the www.RPTempering.com website to read more application articles, data sheets and test data.

Proto-Reinforcement® Infiltrate Application Examples:



SLS Flex Cord passed 20,000 flexes without fracturing.



SLS Egg Carton Thin Wall Living Hinge package fully functional.



SLA fully functional wire connection box.



Other applications.

Hi-Temp Protoplass® Clear Coating

Hi-Temp Protoplass® Spray Coating is available only in 12oz spray cans. Available colors are Black, Red and Clear on the color chart below. Hi-Temp Protoplass® sometimes will be used with Proto-Reinforcement® Infiltrate Coating to achieve maximum results. This is achieved by using our base tempering formula, micro blended plasticizers, alumina, ceramic and other inhibitors. Slows done UV Light aging by 85%. Hi-Temp Protoplass® will enhance the mechanical properties, electrical insulating properties, Thermal Properties, Resist Heat Soak, Heat Resistance, Heat Deflection, Chemical Resistance. Resist Microscopic Porosity and Resistance to Hot Wax for use in Casting Molds. This is easy to apply to the outside of part surface areas. When applied will result in a smooth finish and a layering thickness of .0013".



Heat Deflection Test Comparison Result SL WS11120



Standard SL WS11120 Heat Deflection is 110° Degrees F
Tempered SLA WS11120 Heat Deflection is 405° Degrees F

Hi-Temp Protoplass® Application Examples:

The picture on the right is the results of a heat deflection test that called for this tensile bar to be cantilevered with 1.81 MPa of weight on top of tensile bar at the end while in 80% humidity. It is important to remember that on the heat deflection test the parts were cantilevered with weight out on the free end. In most real world applications this would be attached, which should result in a high heat deflection value. The average Heat Deflection enhancement over the base material specification when tempering is applied is 3X. The average heat resistance enhancement over the base material specification when tempered is 4X. Multiple materials equaling hundreds of samples have been tested with Hi-Temp Protoplass® using the RP Tempering™ Engineered Layering Technique. Thermal Property Test Data can be found on the Hi-Temp Protoplass® Test Data Sheets at the www.RPTempering.com website. Test Data will include: Heat Deflection (1.81 Mpa & Dwell Time), Heat Resistance, Thermal Conductivity, T/g, Coefficient of Thermal Expansion/Contraction, Melting Point, Insulation Heat, & Insulation Cold.

The Intake Manifold pictured in the center above is made from FDM ABS and coated with Proto-Reinforcement® and Hi-Temp Proto-Plasma™ Coatings. This real exhaust was attached to a miniature Indy car engine and performed excellent during actual driving time.

Fire Retardant Protoplass® Cclear Coating

Fire-Retardant Protoplass® Spray Coating is available only in 12oz spray cans. Available colors are Grey and Clear on the color chart below. Fire Retardant Protoplass® sometimes will be used with Proto-Reinforcement® Infiltrate Coating to achieve maximum results. This is achieved by using our base tempering formula, micro blended plasticizers, alumina, ceramic and other inhibitors.

Fire Retardant Protoplass® will pass all thr UL94 Burn Test, UL Fume Test and the automotive MWSS302 Fire Code. Slows done UV Light aging by 85%. Hi-Temp Protoplass® will enhance the Mechanical Properties, Electrical insulating properties, Thermal Properties, Resist Heat Soak, Heat Resistance, Heat Deflection, Chemical Resistance and Resist Microscopic Porosity. This is easy to apply to the outside of part surface areas. When applied will result in a smooth finish and a layering thickness of .0013".



Grey Black



1200° F open flame deflects off thin wall SL part

Fire Retardant Protoplass® Application Examples:

The above pictured is a 1200 Degrees F open flame on a piece of Duraform™ SLS and does not burn. SLS (PA & GF) and FDM (PC & PPSF) will pass all the UL94 Burn Test Criteria at the highest level, including: Vertical Burn Test V-0, Horizontal Burn Test H-B and Surface Burn 5V-A. Several other SFF materials will pass the MVSS302 Automotive Burn Test Code. Multiple materials equaling hundreds of samples have been tested with Fire Retardant Protoplass® using the RP Tempering™ Engineered Layering Technique. Thermal Property Test Data can be found on Test Data Sheets. ASTM industry test standards were followed whenever possible.

EMI Shielding (EMI-Temp®) Spray

EMI-Temp® offers our customers easy to follow application techniques for EMI Shielding applications. EMI-Temp® is easy to apply, dries fast and is cost effective verses sending out to an EMI Shielding House at a premium part price, long lead times & setup cost for masking fixtures. This will cover approximately 80" square inches of part area. Shield radio frequencies waves and a wide range of decibel "db", frequencies and Hz. This is one of our most popular products. Stop sending your parts out for EMI shielding and do them in minutes.

The most common electrical property applications are for EMI shielding. The initials "EMI" stands for Electro Magnetic Interference. Electro Magnetic Frequency Interference shielding can be achieved by using highly conductive materials, such as 1 to 3 micron sized copper particles. EMI Shielding is done for two primary reasons:

- To keep electronic device from interfering with others
- To keep other devices from interfering with yours.

EMI-Temp® Shielding was developed for low volume use for rapid prototypes (all RP/SFF materials & systems), injection molded plastics and many other materials. This particular shielding product has copper/aluminum/nickel combined. Shielding against magnetic fields is difficult. Our EMI products should be effective as energy is reflected. Then when the rest of the energy is transmitted across the surface boundary and absorption further attenuates it. This way we can meet certain applications by inhibiting electro magnetic waves and impeding the field. Most metals have low impedance. Low impedance energy is more likely to be absorbed. If the electrical field wave impedance is high most of the energy is likely to be reflected. At higher frequencies our EMI shielding is governed mostly by absorption.



EMI Shielding Application Examples:

Cricket Cell phone using both EMI and RFI shielding pictures at far left. The center picture shows a battery cover and remote control circuit board cover. In the picture on the right is a miniature transformer case for an aerospace application.

RFI Shielding (RFI-Temp®) Spray

One can covers 60" square inches of part surface area. Shield radio frequencies waves at a wide range of decibel "db", frequencies and Hz. Pictured is a Cricket phone above under the EMI Shielding part of this news letter it also has RFI Shielding in the antenna cover area. Other particle types and blend available up on special order the will enhance the electrical properties in mechanical device. RFI-Temp® offers our customers multiple easy to follow application techniques for every EMI & RFI Shielding Products. RFI-Temp® is easy to apply, dries fast and is cost effective verses sending out to an RFI Shielding House, at a premium part price, long lead times & setup cost for masking fixtures. The initials "RFI" stand for Radio Frequency Interference. RFI for the most part is EMI within the range of 1kHz-10GHz. Radio Frequency Interference shielding can be achieved by using highly conductive materials, such as 1 to 3 micron sized copper, aluminum or nickel particles. RFI Shielding is done for two primary reasons:

- To keep electronic device from interfering with others
- To keep other devices from interfering with yours.

RFI-Temp® Shielding was developed for low volume use for rapid prototypes (all SFF materials & systems), injection molded plastics and many other materials. This particular shielding product has copper/aluminum/nickel combined. Some of our conductive coatings can even reflect the interfering radiation light waves. Shielding against magnetic fields is difficult. Our EMI/RFI products should be effective as energy is reflected. Then when the rest of the energy is transmitted across the surface boundary, absorption further attenuates it. This way we can meet certain applications by inhibiting electro magnetic waves and impeding the field. Most metals have low impedance. Low impedance energy is more likely to be absorbed. If the electrical field wave impedance is high most of the energy is likely to be reflected. The copper/aluminum/nickel particles dispersed in our carrier solution will meet most common RFI shielding applications. Effective in the 1kHz to 10GHz range and blocking decibel ranges from 20dB to 60dB by 85% to 95%. Apply by masking the specified area to be shielded. Next either brush or spray on the Wetted RFI-Temp® per our tempering instructions to meet your required specification. RP Tempering™ has developed a portable spraying system for applying any of our dispersed particle shielding products. See our website or ask a customer representative for more details.



RFI Shielding Application Examples:

In the Cricket cell phone pictured on the left side both EMI and RFI shielding coating was applied. Picture on the right is an radio antenna bypass shielding connector where two different antenna was routed together. RFI shielding was used to keep one from interfering with the other radio frequency.

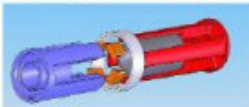
Lubtemp® Coating (Industrial Grade & FDA Food Grade)

Lubtemp® is only available in 11oz spray "Industrial Grade" & "FDA Approved Food Grade" and clear/transparent in color. If your SL, LS, FDM, Digitally Printed or Plastic part application requires a lubricated surface try our LubeTemp® spray products. LubeTemp® will form a thin hard surface about .0005" thick and dries within 15 to 20 minutes. This will help you resist wear and create a smooth slick surface for long periods of time. If you have an application that requires guard because of friction, or increase chance of wear because of a motion application or items that need to slide on this surface without jamming the channel then these are the products to try. This product can be applied to the surface of an SLS, SLA, FDM or digitally printed part giving it a high wear lubricated feel to the surface. When measuring the surface finish roughness it will smooth out the surface of an:

- SLS part by 62%
- FDM part by 57%
- SLA part by 40%
- Digital Printed Parts part by 62%

The coating is cost effective. The secondary post processing technique is quick and easy to apply. A single can of LubeTemp® will cover 1100" square inches of part surface area. Par3 will temper a part free of charge for your review. Contact Par3 for details. LubeTemp® Application Examples:

This piston assembly (pictured on left) made out of SLA slides in and out smoothly and with the LubeTemp® industrial grade applied. It dramatically decreased the wear on individual parts.



This complete production cell (pictured on right) use FDM parts for assemble and fill fixtures. Each individual product that runs down this line has its own set of guide filler fixtures and carriage fixtures. This fixtures are required to guide the filling and packaging of millions tablets/pill into their appropriate package container. The CNC machined fixtures out of plastic and/or aluminum were costly, time consuming and not to mention hard to handle so to the weight of the aluminum fixtures. Now they use ABS FDM parts that can be made in a day and coated with RP Tempering™ Food Grade LubeTemp® Spray to keep the pills from jamming. These fixtures are light weight, easy and fast to create and very cost effective for production to use.

Other potential applications for LubeTemp® include: Spray on surface of molds to easy part release, fixture cavities for easy release, high wear sliding assemblies, tube & channeling for part feeding systems, cylinders, moveable parts and assemblies.

Insultemp® Coating

InsulTemp® is a hybrid synthetic rubber blend with a natural additive. This coating is suitable for high volume production applications and can be applied by spraying, dipping and/or brush on. It is fast drying, easy to apply and very cost effective. This product when applied is an average thickness of .012" inch thick per coat and can be built up to .125" (1/8") inches thick without voids and without masking. If you mask the area to be applied you can achieve .250" or 1/4" thick without voids. Available in 11oz spray cans, 4 oz. cans brush on/dip (stock black and non-stock red & white colors), stock 6 oz. spray cans (stock black & non-stock clear), in stock 8 oz. cans brush on/dip black color only. 1 can of 11oz spray InsulTemp® will cover 400" inches of part surface area. InsulTemp® Application Examples:

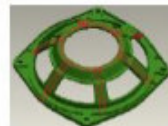
The black RP/SFF parts you seen in the picture on left below have Insultemp® applied. Insultemp® has an electrical insulation capability of 1600 volts per mil. It will pass all the UL94 Burn test criteria to include vertical burn, horizontal burn, surface burn, smoke and fume burn test.



Colors Available:



Black Red Clear



InsulTemp® will reduce vibration signature absorption and deaden sound wave in acoustical applications. You can expect vibration signatures to reduce by an average of 70%. The speaker frame pictured on the right of color chart tempered with InsulTemp® achieved 65% less vibration signatures during testing. Similar test to reduce noise/sound for enclosures prove to be successful too to include absorbing sound in a wide decibel range. The SLS handle picture on the far right passed a life cycle fatigue test a 2 weeks in 10° degrees below zero temperature held a 30 pound weight without fracturing.

Other potential Insultemp® applications include: Salt Spray Protection, Enhance Heat Resistance, Resist Low Temperature, Enhance Heat Deflection, Thermally Insulative, Chemical Resistance, Enhance Mechanical Properties, Resist Heat Soak Penetration, Resist Cold Temperature Soak, Electrically Insulative, Excellent Dielectric Resistance, Viscoelastic Dampening properties, Reduces UV Light Deterioration by 70%, Protects Against Abrasion, Enhance Impact Strength, Enhance 1/4 point Flex, Enhance Torque Durability, Acts as a Washer when used in Connecting Terminals & other Connections to keep them from coming loose. Demonstrates excellent resistance to Alkalis, Moisture, Water, Acids and will not dry-out even when exposed to extreme environmental conditions. Please visit www.RPTempering.com to review detailed Technical Data Sheets and other test data.

RF C13® Absorb Coating

This kit will include 1 container each of 2oz base coat and one container of 1oz Multi-wall Carbon Nano Tubes "MWCNT particles. RF C13 will cover approximately 50" square inches of part area. This RP Tempering™ product is named RF C13 Absorb® and was used on these SL parts for a visual stealth application. Frequency waves will not interfere with other electronic parts when several electronic are close together like in a Jet liner.



SL Visual Stealth Application

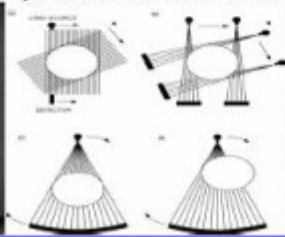
Pictured above are night vision, satellite feed goggles for stealth technology. RF C13 Absorb was applied to absorb microwaves. Radar/Microwave absorbing material designed to attenuate or absorb microwave energy. Microwave energy absorbers are attenuation ranging from 5dB to 15dB on RP/SFF honeycomb substrate. A dielectric loss to absorb the electric field of an electromagnetic wave. Other benefits include: Absorb Propagated Microwave Energy, Load Absorber, Cavity Dampening Absorbers, Reduce Broadband (frequency & angle), Volumetric, Conducting Ground Plan and RAS High Frequency Behavior. Microwave Magnetic (loss) Absorbers (fillers) for example: Iron particles, Iron Ferrite Particles, Nickel Particles and other specialty particle disbursement. Wideband behavior (interference/absorption) increase bandwidth is frequency dependent (UHF & GHz Range) when applied carbon varied results were: absorb microwave energy, electromagnetic wave propagating empty space, dielectric loss, conductive, reduces bandwidth (frequency & angle) and ROS high frequency behavior.

RadiationTemp® Coating Kit (TungstenTemp®)

This RoHS Compliant Radiation Light Blocking Kit (blocks x-rays, MRI & CT Scan) takes the place of lead in part applications. This kit will include 1 container each of 2 oz base coat and 1 oz tungsten micron particles. The kit will cover approximately 50" square inches of part area. This RP Tempering™ product is named RadiationTemp® or Tungstentemp® and was used on the SL parts inside an MRI Scanner pictured below to block radiation light wave and protect the internal parts. This product can shield internal parts from magnetic resonances and radiation.



CT Nuclear Scan



Radiation Light Waves



Actual Internal SLA Parts