RP Tempering™ Technology News

Nano-Composite Technology

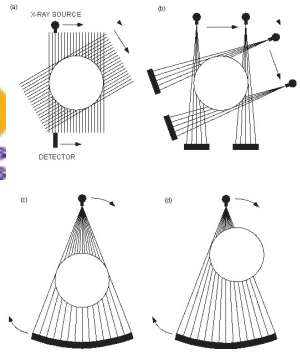
Solid Freeform Additive Technology &
Patent Pending Engineering Technique

Volume 22

August 2008

Materials & Processes for Medical Devices

PAR3 Technology, Inc. was invited to, and attended, this years MPMD Conference at the Cleveland Clinic. As one of the top 4 hospitals in the country, some of the top materials and process experts were in attendance. RP Tempering™ Technologies as well as PAR3's other technical capabilities generated a lot of interest from the medical community. It seems some of our products potentially have some interesting application in both prototyping and real world plastic applications for products. For example:

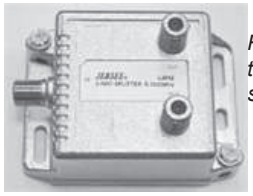


Theses diagrams demonstrate how 98% of the harmful radiation light is blocked in the SL part with TungstenTemp© applied.

TungstenTemp© blocks a high level of radiation light and takes the place of lead parts within medical imaging instrumentation like CT Scanners, X-Ray and MRI machines. This is a cost effective way to use prototype parts with TungstenTemp© inside the machines, which replace actual tungsten filled thermal plastic that are more expensive and very brittle. Using prototype materials for the base substrate part with TungstenTemp©, the prototype parts are much stronger. Also with SFF parts there are no tooling cost involved like injection mold tooling in plastics. This is quite a cost reduction.

This part is an SL part with TungsTemp© injected inside. This part took the place of a thermal plastic part and is in use.

EMI, RF and RFI Shielding also received a lot of attention as we demonstrated its capabilities. Again for the same reason this can be used on plastics also within the apparatus and is very cost effective both during the development stages and in production applications.



RFI shielding application for cable television application.

Insultemp© Spray received interest from device manufactures for its electrical insulation properties. This product is applied very fast and only takes a thin layer compared to using electrical rubber boots that need to be baked and shrunk on the area. Plus, the alternative is very expensive compared to Insultemp© Spray.

Insultemp© used on medium voltage electrical bus bar application to replace insulative rubber shrink boots. This presented a 70% cost reduction in materials alone.

This new product is an excellent way to achieve high voltage electrical insulation while being applied very quickly. This 1500 volts per/mil insulation spray material works on almost any type of surface to include prototype parts, plastic parts, copper, metal and more. You have the application option of a spray-on, brush-on, or dip coating. This can be applied in a manufacturing plant as well as remotely. InsulTemp© comes in black, red, yellow, white, blue and even clear. Other benefits are greatly enhanced thermal property insulation along with being solvent resistant. It also works well in any weather situation including extreme heat, extreme cold, rain, ice and it even passed a severe salt spray test!

In This Issue

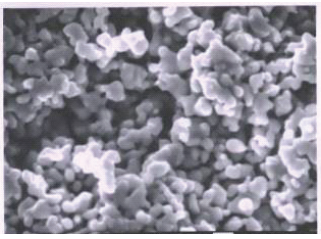
Proto-Plasma-Rx™ Spray was a hit for its sound dampening qualities as well as being able to reduce natural frequencies and vibration signatures by up to 90% with some materials. This product can be used on most any materials including plastics, alloys/metals and prototype materials. It goes on thin, is cost effective, fast and can be applied in the field during services call if needed.

When Proto-Plasma-Rx™ was sprayed behind on the LS door panel and on the steel of the car door the sound was dampened by 5x on the outside of the car allowing the music to flow inside.

When InsulTemp© was tested on the inside SL covers of this calculator the noise was reduced by 200% and vibration signatures were reduced by over 70%.

MRI Invisible Product

An MRI invisible product is within reach for RP Tempering™ Technologies. PAR3 has been working on a product that would be invisible to an MRI scan for over a year. We have finally achieved some excellent results that are repeatable according to our internal testing. We are now looking for companies to BETA test this product before it reaches the market.



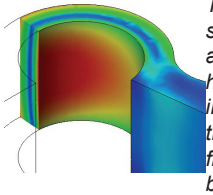
Picture of combined elemental particles & alloys under micron microscope.

The basic application uses multiple micron size, almost nano scale, elemental particles and alloys to form a group of "magnetic particles". This has provided promising applications for not only magnetic resonance imaging (MRI) but for magnetic storage, RF and more. PAR3 has formulated Iron, Iron Oxide, Cobalt and Tungsten particles to achieve this break through.

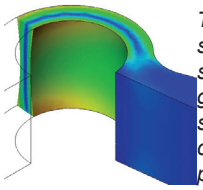
FEA Analysis Driven Design Dramatically Improves Parts

RP Tempering™ is not only a coatings process. The RP Tempering™ patent has 54 claims that discuss designing internal wall geometry to change and enhance the physical and typical properties within a prototype part, as well as other metallic and non-metallic materials. This can be done quickly and will not affect your customer's original design or the outside appearance and/or surfaces. This technique is really beneficial for larger, thick walled parts of .060 inch or more, assembly structures and part designs that need to be functional with human and/or application interaction. We have completed this technique on parts designs ranging from chairs, shoe soles, speakers, large covers for equipment, aerospace inner ductal systems, internal covers, race car parts and more.

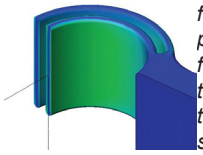
This process does not take long. All we need to get started is the part design parameters, and your customer application requirements for mechanical properties and practical use. After we know this, the engineers at PAR3 will use FEA techniques to design internal structures within the walls of the part to address mechanical properties like stress, impact, flex, stiffness, torsion, vibration and tensile strength. We do an FEA on the base part design and then individually analyze potential areas of concern and/or areas we want to improve. The following 3 pictures show stress (RED in Color) goes away by just adding a gap in the hinge and RP Tempering™ was not needed to achieve these results.



This standard part design screen shot of an FEA analysis demonstrates high stress areas shown in red are not allowing the part to flex. When we flexed this standard part it broke immediately.



This next FEA analysis screen shot of an internal slot part design with a .062" gap does greatly reduce the stresses shown in red when compared to the standard part design above.

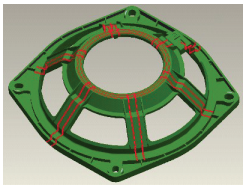


To improve this part design functionality even more we performed FEA on 11 different internal wall designs to completely redirect the stresses. As the FEA screen shot demonstrates all the stress (red) is gone. The picture shows a gap in the part but in the actual file the slot is only a break in the material with little or no gap. We designed the slot to extend to the outside wall of the part but we could have stopped short by .125" in each side to hide the internal wall design. This living hinge is fully functional.

We know now that we can do this for most any design in the future without doing all the FEA experimentation. PAR3 has a whole library of internal wall geometry that is already proven to work for the appropriate mechanical property enhancement.

Tunnels and scaffolding can give us other benefits by redirecting stress, creating stiffness, flexing more and/or other mechanical property enhancements. After we complete the FEA, we will put the geometry into the part file so that the SFF/RP part can be made. The FEA and 3D CAD process usually takes about 1 or 2 days. PAR3 will create a duplicate 3D file and STL file for the part to be made so that we do not disturb your customer's 3D parametric file. In most cases now, we do not recommend that you back fill the voids. The internal structure and scaffolding create the enhancements by themselves.

This racing bike has an LS part inside the fork and the LS part has internal geometry to reinforce the "Y" area bracing it for impact. Initial test results are promising.



The speaker grill has internal tunnels and other structures, shown in red, to enhance the LS part to pass a life cycle test for speaker distortion.

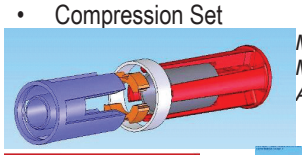
This LS toddler car seat designed for a child up to 65 lbs, passed a sled car crash test with only a minor fracture. Although the internal geometry is complex and it took 3 days to complete, this FEA project is the most impressive success to date. Engineers were successful in redirecting the stresses, creating flex where needed and adding internal rib structure to enhance impact strength.

PAR3 can do the FEA process cost effectively. All you have to do is send a 3D part file to us and we will return a quote that same day. This only has to be done once and then you can make as many parts as you want. To learn more about this process please contact Earl Dunlap at PAR3 Technology, Inc.

PAR3 Technology FEA Services

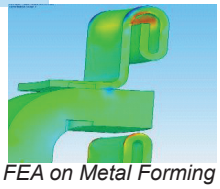
PAR3 Technology, Inc. offers high level FEA and Structural Modeling services to industries such as Aerospace, Automotive, Medical and Consumer products. We have CF Design, Cosmos and Ansys Software in house to support most any FEA project. We have experienced engineers, well versed with FEA and these software packages. Below we have listed just some of the capabilities of FEA:

- Non-Linear Analysis
- Linear Analysis
- Non-Linear Materials Behavior (Plastics, Rubbers & Metals)
- Structural Stress/Strain Analysis
- Thermal Analysis (Expansion & Contraction)
- Creep
- MVH Mechanical Vibration
- Fluid Dynamics
- Modal Analysis
- Vibration
- Impact
- Fatigue Life
- Compression Set

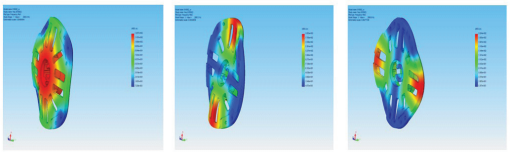


Motion Analysis Medical Pump Application

FEA Automotive Under-hood Gasket Application



FEA on Metal Forming & Sealing Application



FEA Modal Analysis on an Electric Motor Application: metal to plastic conversion and cost reduction project.

In the electric motor application PAR3 successfully designed a plastic part which passed all the industry standards and reduce the manufacturing cost. The plastic will meet all the industry standards including the UL criteria. And for specific applications when the plastic part cannot be used, we successfully reduced the weight of the metal part by 18% offering our a substantial cost reduction - a win-win in both cases. Our knowledge of material sciences, mechanical engineering, manufacturing processes, and FEA helped our customer exceed his expectations for this project.

PAR3's primary services are: Industrial Design, Research, Mechanical Engineering, Electromechanical Design, 3D CAD Modeling, FEA, CFD Analysis, Materials Science, Manufacturing Engineering Consulting, Testing, Technical Research Planning, Bench Prototyping of working designs that we engineer, cost reduction specialist and on site training for companies to learn FEA and CFD.

Food Grade & Industrial Grade LubeTemp© Spray

If your SL, LS, FDM, Digitally Printed or plastic part application requires a lubricated surface try our LubeTemp© spray products. We have both an industrial grade and food safe grade. LubeTemp© will form a thin hard surface about .0005" thick and dries within 15 to 20 minutes. This will help you resist ware and create a smooth slick surface for long periods of time. If you have an application that requires a guard because of friction, faces an increased chance of wear because of a motion application, or items that need to slide on this surface without jamming the flow path, then these are the products to try.

The picture below is a complete production cell that uses FDM parts for assembly 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. Quantech Company CNC machined the fixtures out of plastic and/or aluminum. This was costly and time consuming, not to mention cumbersome and hard to handle with 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.

Quantech Production Tablet Pill Filler Line using RP Parts with LubeTemp©

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