Subject: WSF Strength Question
Posted by OrbRacing on Sat, 17 Mar 2012 10:49:46 GMT
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Hi everyone,

I plan to get a prototype part for an RC Car printed soon, in WSF, and I had a question regarding the strength of the material.

The WSF parts are porous, so it wouldn't be as strong as say a solid extruded bar of the same material, so it matters whether the data of the material are from a solid bar or from material samples that were actually produced with an SLS printer.

I read through the datasheet, but to me it's not completely clear whether the tensile strength is of the material itself, or the material when processed through the SLS process. So does anyone know this?

PS: Here are some images of the part - it's a block to which a suspension arm mounts on a Tamiya Dyna Storm.

Subject: Re: WSF Strength Question
Posted by stonysmith on Sat, 17 Mar 2012 11:49:05 GMT
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It's PA 2200 Nylon. The strength comes from the material itself, and has very little to do with the SLS process.

Subject: Re: WSF Strength Question
Posted by OrbRacing on Sun, 18 Mar 2012 08:45:00 GMT
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I have no worries that the printing process makes a strong bond between the different particles of the powder - actually strong enough as molded Nylon.

My worries however are in regard to the fact that there is actually slightly less material in the 3D printed part compared to the same model being molded, machined or printed with an FDM printer because it's porous. Hence my question whether the production method has been taken into account in the material data sheet or not.

I could ask EOS, the supplier of the material, but I contacted them before about other stuff but never got a reply, hence why I am trying to find answers elsewhere.

Subject: Re: WSF Strength Question
Posted by stannum on Sun, 18 Mar 2012 20:11:50 GMT
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Bones are also porous, and beams with holes can be better than solid ones. ^_-

You should visit EOS page, they have the specifications for the PA2200 fused using different settings. But you will have to guess with one SW really uses and in which orientation each run is done.

Subject: Re: WSF Strength Question
Posted by OrbRacing on Sun, 18 Mar 2012 20:25:23 GMT
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Thanks, I'll definetely have a look at that As for the actual strength, if I model everything going by the 'worst' numbers, then I guess everything should be allright!

Subject: Re: WSF Strength Question
Posted by OrbRacing on Wed, 04 Apr 2012 07:23:08 GMT
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Here are the official assembly instructions There is an option to use low profile/thin nyloc nuts, which means 12mm screws may be good enough (I haven't been able to measure it yet). With normal nyloc nuts 14-15mm is enough.

Progress by 29-03-2012:
Here is the first picture of the printed blocks:

Progress by 03-04-2012:

The parts needed slight modding: The holes were slightly too small for the bushings, and the length of the piece in which the bushings sit was slightly too long. Other than that, the fit is just as good as the original part! I hope to start testing this week.

Subject: Re: WSF Strength Question
Posted by Tamert on Wed, 04 Apr 2012 18:44:47 GMT
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You might also wish to consider other resins that have fiber reinforcement. One of the big problems with fused nylon is that once a crack starts it will propagate along the part due to the microscopic air gaps everywhere. While the tensile strength may look to be near "bulk" this is a static test and not a dynamic load test which is what your parts are going to be exposed to during use.

I recommend that you investigate the following resins:

1. DuraForm HST
2. PA 640-GSL

These resins contain fiber glass and carbon fiber reinforcement respectively. Inclusion of these fibers dramatically increase the final product's ability to manage dynamic loads as well as prevent crack propagation.

These resins are commonly used in aerospace parts that also must handle dynamic loads.

Subject: Re: WSF Strength Question
Posted by OrbRacing on Wed, 04 Apr 2012 19:06:45 GMT
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Thanks for the advice. I'd definetely be interested in stronger (yet affordable) materials, but where are printing services for these?