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Subject: Can Shapeways find a TRUE Stainless Steel to use?

Posted by [lensman](#) on Sun, 14 Oct 2012 14:24:23 GMT

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Over the years a number of my customers (and even I) have asked why the Stainless Steel used by Shapeways is called 'stainless' ? Customers report that the s/s is not what they were expecting (obviously didn't read enough about the material here) and I know that the few rings and pendants I've had made myself - and worn - end up looking a little ugly (surface corrosion). The key here, I believe, is salination from the body. Other items I've had made and kept in boxes still look decent. Overall, though, I still think the material should be named bronze-steel to more accurately reflect the way it's made. Perhaps the present s/s does have a minimum 10.5% chromium which defines the steel alloy commonly called stainless steel - or maybe it doesn't, either way it doesn't look like the s/s cutlery we all have in our kitchen drawers and most certainly doesn't look like the s/s used in a lot of jewellery.

Anyway, my whole point to this was to ask the question, is Shapeways looking for a material to replace stainless steel? After all, if Titanium can be used in 3D printing surely a nice s/s can be found with a process that doesn't involve "bronze infusing" ?

Glenn

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Subject: Re: Can Shapeways find a TRUE Stainless Steel to use?

Posted by [mkroeker](#) on Sun, 14 Oct 2012 18:23:00 GMT

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Methinks

A: no such thing as a "TRUE stainless steel" for all conceivable use cases - and the combination of high salinity and presence of organic acids is probably among the more demanding environments for steels.

B: the "grade 420-like" material that shapeways uses is probably ideal for sculptures and tools - grades more appropriate for prolonged skin contact could be either not durable enough for tools or not suitable for sintering.

C: the "great for jewelry" slogan on the materials overview page should be accompanied by a paragraph on jewelry-specific issues on the dedicated page for stainless steel - currently one has to trawl the forum entries for user-supplied recommendations regarding varnishing of pendants or fitting of gold sleeves on rings. Also it is there only that one currently finds information about the method used for, and durability of, gold-plating. Perhaps the rewrite of the materials section for the new "dyed WSF" materials

provides an opportunity to adress these issues ?

Martin

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Subject: Re: Can Shapeways find a TRUE Stainless Steel to use?

Posted by [stannum](#) on Sun, 14 Oct 2012 22:58:08 GMT

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mkroeker wrote on Sun, 14 October 2012 18:23B: the "grade 420-like" material that shapeways uses is probably ideal for sculptures and tools - grades more appropriate for prolonged skin contact could be either not durable enough for tools or not suitable for sintering.

It "rusts" even without skin contact... because there is a 40-30% of bronze mixed with it (composite, not alloy). GlenG showed a nice crab that had been years outside and it was clearly "stained". The name of the material never was exactly right.

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Subject: Re: Can Shapeways find a TRUE Stainless Steel to use?

Posted by [GlenG](#) on Mon, 15 Oct 2012 16:32:56 GMT

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The hardware system and process employed by Shapeways requires the use of a bronze infiltrant to produce all the parts referred to as stainless steel. There is no way around this. It's what makes the whole process possible. There are other processes for printing direct in metal and they achieve this without the use of infiltrants. However the cost factors with these print systems (SLS or SLM) is several times more expensive, (like 8x)! I'm relatively certain that SW will not offer these services due to this cost factoring.

-G

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Subject: Re: Can Shapeways find a TRUE Stainless Steel to use?

Posted by [Bathsheba](#) on Mon, 15 Oct 2012 22:07:21 GMT

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It's not that we're down on the metal, it's a great material for the price. You know I know that.

I join previous posters in wishing Shapeways would stop calling it "stainless" without modifiers. The material does not have the appearance or anti-rust properties that people expect in a metal described as "stainless". It's misleading and causes disappointed customers.

There's no reason for it -- there's nothing to lose and everything to gain by describing the material accurately. On my site I'm careful always to describe it as a "steel/bronze composite metal", and to warn that it can rust. If that puts anyone off, it's the people who were going to send it back anyway when they saw that it's not stainless!

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Subject: Re: Can Shapeways find a TRUE Stainless Steel to use?

Posted by [lensman](#) on Tue, 16 Oct 2012 12:29:58 GMT

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Now THIS is what I want in Stainless Steel. One of Shapeways competitors has released this version of s/s. Described as "High grade stainless steel (316L) that delivers a significant level of detail and strength to your model, making it suitable for boardgame figures, miniatures, keychains, jewelry, bolts."... "Details go from 0.3 mm and wall thickness goes from 1.0 mm", and "...even did a test on rust: he put a high detailed stainless steel design in a bath with salt and no marks of rust are visible."

Printing consists of "...binding ultra fine grains of stainless steel powder in a precision inkt jet printer. The model is carefully taken out, depowdered and sintered in an oven at around 1300 degrees."

Pricing (keep in mind this site always charges more than Shapeways)

â€¢A model of 10 x 10 x 10 mm will cost you 18,2â€ (US\$23.76)

â€¢A ring of 23 x 23 x 5 mm will cost you 35,31â€ (US\$46.10)

â€¢The Aislin figure below of 15 x 15 x 35 mm will cost you 89,7â€ (US\$117.11)

So, not that much more than charged now for s/s here, and certainly not 8 times as much.

One image of this material below and two more following.

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## File Attachments

1) [imat ss1.jpg](#), downloaded 346 times

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Subject: Re: Can Shapeways find a TRUE Stainless Steel to use?

Posted by [lensman](#) on Tue, 16 Oct 2012 12:31:32 GMT

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Image 2

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## File Attachments

1) [imat ss2.jpg](#), downloaded 334 times

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Subject: Re: Can Shapeways find a TRUE Stainless Steel to use?

Posted by [lensman](#) on Tue, 16 Oct 2012 12:33:16 GMT

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Image 3

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## File Attachments

1) [imat ss3.jpg](#), downloaded 328 times

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Subject: Re: Can Shapeways find a TRUE Stainless Steel to use?

Posted by [lensman](#) on Tue, 16 Oct 2012 12:35:52 GMT

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Sorry, Shapeways but this is exactly what I was looking for in stainless steel and, once I have reviewed all other costs and shipping times, I will very likely take all my s/s prints there now...

Glenn

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Subject: Re: Can Shapeways find a TRUE Stainless Steel to use?

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Posted by [Youknowwho4eva](#) on Tue, 16 Oct 2012 12:48:03 GMT  
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Now that Inshape is mostly out of the way, I assure you new materials will be coming. The new polished colors are just the beginning. We'll let you know more as things develop.

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Subject: Re: Can Shapeways find a TRUE Stainless Steel to use?  
Posted by [mkroeker](#) on Tue, 16 Oct 2012 12:50:24 GMT  
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Do you already have own experience with this new alternative, i.e. are these images of regular prints of your own models, or are you just reposting their promotional material ?

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Subject: Re: Can Shapeways find a TRUE Stainless Steel to use?  
Posted by [lensman](#) on Tue, 16 Oct 2012 13:08:15 GMT  
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I am reposting promo images. They have more on Flickr. VERY impressive detail in small models.

@Bathsheba - I see you already have experience with this metal. Care to share your thoughts?

Glenn

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Subject: Re: Can Shapeways find a TRUE Stainless Steel to use?  
Posted by [Bathsheba](#) on Tue, 16 Oct 2012 18:46:22 GMT  
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Yes, I've been using this stuff for a year, and gossiping about it a lot too. It is very nice. The company is formerly fcubic, just acquired by Hoganas.

fcubic's resolution is much higher and the metal is true stainless, but the cost-effective build envelope is small. It's like a Solidscape that prints steel, where Ex One is like a ZCorp that prints steel. A thing about the stainless is that when you have a metal that doesn't oxidize, it's also a metal that won't take a patina. The parts sometimes look a little raw to me without that.

I don't see it as a replacement for the metal Shapeways is using now, the steel/bronze by Ex One:

its applications are different and I expect to continue using both. Since my designs are mainly larger parts with a fine-art-style finish, most likely Ex One will still be my wheelhouse. Attached is an image showing both types of part, and you can see they're just not the same thing: you couldn't make the bottle opener with fcubic, you can't make the pendants with Ex One.

The pricing you mention sounds optimistic to me; I've been paying more than that working directly with the manufacturer. I don't know which is accurate: maybe I'm getting rooked, maybe the service bureau's prices aren't sustainable. My feeling is that this company hasn't yet done enough volume to stabilize its pricing, and then of course it just changed ownership...I wouldn't be surprised if prices jump around some before we find out what this stuff really costs.

Gripping hand, it's great stuff and I totally think Shapeways should carry it -- certainly I've mentioned it to them -- but in addition to and not as a replacement for the steel/bronze metal.

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### File Attachments

1) [klein\\_flock.jpg](#), downloaded 97 times

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Subject: Re: Can Shapeways find a TRUE Stainless Steel to use?  
Posted by [lensman](#) on Tue, 16 Oct 2012 20:09:37 GMT  
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Thanks Bathsheba, very interesting. I agree that I'd like to see both available. Pricing is for the test period so, yes, that could well change. Someone here sent me a private message after comparing prices on just one model (I don't know the size) but the new s/s offered by the competition was four times the cost of Shapeways s/s (and silver was twice the price, if anyone's interested in that).

Glenn

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Subject: Re: Can Shapeways find a TRUE Stainless Steel to use?  
Posted by [mkroeker](#) on Tue, 16 Oct 2012 21:33:02 GMT  
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Thanks Bathsheba for putting things into perspective. I am too clumsy and unimaginative to do

jewelry, so

I will gladly wait for shapeways to buy the next generation cubic with bigger print envelope. 3d printer development appears to be on the level where "conventional" printers were in the early 1980s, when laser printers started to become practical for business use and the more ambitious home users started to replace their 9-pin dot matrix printers (1st gen makerbot ?) with 24-pin (form1 ?)

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Subject: Re: Can Shapeways find a TRUE Stainless Steel to use?

Posted by [GlenG](#) on Wed, 17 Oct 2012 20:08:04 GMT

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The F-Cubic process is similar to the ExOne process. MINUS the bronze infiltrant. The reason that this process has a limited print size is that without an infiltrant the printed parts shrink (considerably) during the sintering phase. Both processes use spherical stainless powder during the printing phase. Imagine this raw printed part as a stack of marbles. So there is a lot of void between the stainless particles, like 40% of the total volume. ExOne uses bronze to infiltrate these voids and produce parts of almost full density (98% or so). Without the use of an infiltrant, the only way to achieve high density parts is to extend the sintering cycle time which allows the stainless particles to coalesce into a nearly solid mass. BUT there will be a LOT of shrinkage, do the math. The larger the part the less linear and predictable this shrinkage factor becomes. Distortion, cracking, ie junk parts are the result. So the size limitation with F-Cubic has little to do with the size of the printing hardware, it's a limitation of the process.

I agree with Bathsheba. Both systems have their place, with advantages and disadvantages inherent in both. For some jewelry FCube is a no brainer. BUT keep in mind some folks are prone to allergic reactions even with 316 SS, which not only contains chromium but nickel as well.

-G

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