
Subject: Wall thickness check without ordering?
Posted by [lorddarthvik](#) on Fri, 05 Jun 2009 14:29:41 GMT
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Hi there!

This post is mostly aimed at the Shapeways team, but all of the community may be interested in this, so I am posting it here.

@Shapeways team:

I have had a wall thickness issue with the latest model I ordered, so I will have to re-model it. The models shape is pretty complicated, so I'm sure I can't completely check it for wall thickness issues by myself. As I wouldn't like to stress your team and myself with ordering the model 2-3 more times (wait time till feedback, lots of work with canceling the order and returning the payment on your part and so on), I would like to ask if you have a way of checking it fast and sending a simple feedback in email. Also, if this is possible, whom should I send the mail including my model?

If there is an automated way, it would be nice to see it implemented in the shapeways "my models" page. I think that lots of us would rather use that then go through all our models with a 1x1x1mm box object comparing the models wall thickness.

Another question is, what do you consider a wall? How large is that part that you count as a "wall", and what is considered as "detail part" which may be smaller then 1-2mm thick? I am asking this because I did read the faq/tutorial section about it, but I have already ordered multiple prints which have thinner/smaller details then 1mm, and they came out alright.

Subject: Re: Wall thickness check without ordering?
Posted by [WiKKiDWidgets](#) on Fri, 05 Jun 2009 17:58:18 GMT
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You're not alone with getting bitten with the wall thickness issue. (I'm notorious for it. hehe)

I have spoken with several members of the Shapeway staff and I assure you they are well aware of the issue and trying to remidiate it. I am really hoping for an offline 'client' to test the models for everything prior to uploading. (there is a blender scripts that does a really nice job for checking the manifoldness.)

As for what is considered the 'wall' is an easy concept. From a CAM perspective (Computer Aided manufacturing) a 3D model is considered a solid object unless it has both and outter geometry and an inner geometry. An inside and an outside. The wall thickness is the distance from the outer surface to the inner surface,

The attached illustrations simplifies the concept. The red area represents the inside of the model. the grey area represents the outer surface.

A solid object

A hollow object

As you can see, with a hollow object, the overall volume is vastly reduced. This also reduces the cost of printing your model.

If at any point, the red area (thickness) is under the required thickness, then you get the 'Too thin' issue.

thats a rudimentary explanation.

I hope it helps!

WiKKiD Widgets

File Attachments

- 1) [Shapeways-Wallthickness_hollow.jpg](#), downloaded 1303 times
 - 2) [Shapeways-Wallthickness_Solid.jpg](#), downloaded 1221 times
-

Subject: Re: Wall thickness check without ordering?
Posted by [WiKKiDWidgets](#) on Fri, 05 Jun 2009 18:24:21 GMT
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Just thought of something after I posted that.

Here is a little better illustration:

The grey is your outter surface
The red is the 'Wall thickness'
and the green is your inner surface.

The distance at any point in your model from the Grey surface (Outer) to the Green surface (Inner) is considered your 'Wall thickness'

In my example, it is very uniform and exactly the same all over the model. In a complex model, the wall thickness can vary greatly.

A hollow object.

For clarification, a solid object will have no 'inner' surface. I.e. no Green area because the entire volume is a solid mass. Think of a golf ball compared to a ping pong ball. A golf ball is solid, a ping pong ball is hollow.

File Attachments

1) [Shapeways-Wallthickness_hollow2.jpg](#), downloaded 1250 times

Subject: Re: Wall thickness check without ordering?
Posted by [lorddarthvik](#) on Fri, 05 Jun 2009 18:55:37 GMT
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Thanks for your answers!

My model in this case did Pass all the upload checks, but it didn't pass when going into production, probably manually checked by a real person using some automated or manual method. I do understand that what should wall thickness mean, but as stated above, I have models with small parts which have a "wall thickness" of less than the recommended 2mm, and even less in some cases than 1mm. One example is the chain on my DarkPriest figure, the chain is made up of less than 1mm thick parts, but its well over 1cm long. Its only connected to the model on 3 points, the start-mid-end points, and still it is perfect, and didn't break. So still the question remains: what is the size of a wall/solid surface, that is considered a wall when checking?

It's good to know also, that if you upload a model which is made up of several parts, but all those are part of a single object in the software you used, the model will pass the automated thickness and size checks if the whole group of objects is bigger than the minimum sizes. At least this happens when the model is uploaded in the collada (.dae) format.
Check this out for an example: http://www.shapeways.com/model/33831/test_test_test.html

This way you may upload models which will be unprintable. I am pretty sure that the shapeways

team will do something about this in the future though

Subject: Re: Wall thickness check without ordering?
Posted by [WiKKiDWidgets](#) on Fri, 05 Jun 2009 20:01:26 GMT
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Ahh! I getcha.

A wall, is an area of the model that has an outer surface, and an inner surface. Detail is parts of the model that protrude from the models outer surface, but does not have an inner wall.

The Purple would be considered detail in this case.

I am guessing here. That the detail can be much thinner because it is solid. The walls can't be as thin because it would make the model flimsy and fragile.

Am I making sense?

File Attachments

1) [Shapeways-Wallthickness_hollow_detail.jpg](#), downloaded 1193 times

Subject: Re: Wall thickness check without ordering?
Posted by [WiKKiDWidgets](#) on Fri, 05 Jun 2009 20:49:27 GMT
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My apologies for not answering all parts of your question at once. I'm actually doing about 6 things at once right now and this has the least of my attention. hehe

A little further explanation. Yes, you can have multiple manifold meshes that intersect each other as part of a single model. this is a holistically unique feature of 3D printing. The ability to create geometry that is totally encapsulated within the printed model. Whereas this is a necessary method in some cases, it can really increase the cost of your model because it adds volume to the printed object. The pricing is based on that volume, not on 'what you can see'

The yellow object in this illustration would be an example of a separate manifold mesh that intersects the main model.

But to a 3D printer, any portion of that separate mesh that protrude beyond the inner wall, is considered more or less as part of the inner wall. (note the green part on the inside)

and any part of the separate mesh that protrudes beyond the outter surface, would be considered part of the outter surface. I use Purple here because my example separate mesh is a solid object, so the projection would be classified as Detail, not wall thickness. If the separate mesh was hollow, the same sort of rules apply. but it gets rather complex as to what is inner and outer obviously.

it is important to understand that separate intersecting meshes add volume to the model, and volume means more printed material, and thusly, more money.

File Attachments

- 1) [Shapeways-Wallthickness_hollowsepmesh1.jpg](#), downloaded 1201 times
 - 2) [Shapeways-Wallthickness_hollowsepmesh2.jpg](#), downloaded 1188 times
 - 3) [Shapeways-Wallthickness_hollowsepmesh3.jpg](#), downloaded 1201 times
-

Subject: Re: Wall thickness check without ordering?
Posted by [lorddarthvik](#) on Fri, 05 Jun 2009 21:05:04 GMT
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Yep, you are making sense! I was thinking the same thing so far, but still remains the question about the chain being smaller which I mentioned above.

Here's another thing I was thinking about:

On the top of the picture, you can see that the thickness of the wall is constant, and below it is not. Where is the threshold? What is the wall thickness/size where the lower solution would pass and

print alright? So, whats the max of X for WSF and Detail materials?

As far as the tutorial goes, the lower method should never occur, one should always model in a way to avoid this case. My question is, after seeing on my prints that it is not entirely impossible to work, what are the numbers we should keep to?

On the scale Im modeling things, this situation happens more then once. So far it was only happening with very small pieces, which can be considered detail parts of the model. Still, it would be nice to know if this could be used on larger then-a-few-mm scale detail parts.

File Attachments

1) [shfWT.jpg](#), downloaded 1173 times

Subject: Re: Wall thickness check without ordering?

Posted by [akeno](#) on Fri, 05 Jun 2009 22:10:59 GMT

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I'd love for an offline client.. I'm also a victim of the wall thickness errors. If there was something that checked thickness even during uploading stages it'd probably save a lot of trouble and stress in the long run for both parties of worker and customer

Subject: Re: Wall thickness check without ordering?

Posted by [WiKKiDWidgets](#) on Fri, 05 Jun 2009 23:04:51 GMT

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I wouldn't be able to answer that without knowing how Shapeways software goes about measuring. If it's the distance between faces, then that would be more forgiving if the measurement was between vertices. I am guessing once again here, but I would imagine it is actually the 3D printers software that they are using to validate the wall thickness.

As for the chain on your priest model, it's difficult to deduce an answer as I do not know how it is modeled. Making an educated quest, I would surmise that the chain links are solid, and hence Detail.

The same type of illustration you are using to ask your question here is being used to explain the wall thickness in the shapeways FAQ section.

Subject: Re: Wall thickness check without ordering?
Posted by [WiKKiDWidgets](#) on Fri, 05 Jun 2009 23:28:04 GMT
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It would be a nice feature to have a Shapeway utility to check models before uploading them, but I would be happy with just knowing after it was uploaded that everything was OK. Not waiting till I am expecting it to be delivered to find out it can't even be printed. But, again, I am guess the wall thickness check is done by the actual 3D printer software, so automating it would be something of a nightmare. Does anyone know what type of printers they use?

On an interesting side note. Shapeways is not the first 3D printer outfit I have used. Another shop allowed me to send them models that had no wall thickness at all. Their printer software could assume a minimum wall thickness and print what would normally be considered a solid object as a hollow object. But their service was outrageously expensive compared to Shapeways. and they were also exceedingly highbrow (snobs) about their service acting as though making my model was doing me a favor. hehe.

There is a huge differentiator between how the majority of 3D printing providers regard 3D printing and Shapeways approach. Most companies providing 3D printing services still consider it a lofty cutting edge technology to be used primarily for 'rapid prototyping' for huge companies that won't scoff at a pricetag the size of Texas. Shapeways on the other hand, regards 3D printing as just another manufacturing technique. And I tip my hat to them for it.

Subject: Re: Wall thickness check without ordering?
Posted by [lorddarthvik](#) on Fri, 05 Jun 2009 23:37:42 GMT
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The chain is a solid model you guessed it right, but nonetheless, it is too small if it would be measured as "walls" are. By the way, does the printer really differentiate between closed hollow objects and totally solid objects when measuring the thickness? I thought the process is more

simple then that, seems like I was wrong. But I think we will have to wait for a proper answer and information, maybe in the form of the new technical/advanced tutorials shapeways is making
Thanks for your detailed answers WiKKiDWidgets!

Now that I have kinda hijacked my own thread with the second part of my questions, back on topic
As for checking the manifoldness and scaling is pretty much solved using Accutrans, the only thing that I'm only in need of a fast way to check for wall thickness. Just like Akeno, said above it would save time for both sides, so I hope we get a solution for this sometime in the future

Edited to add:

@ WiKKiDWidgets: I have also met some groups working with rapid proto machines, and acted the same way as you described. They act like that even at my university where we as engineers should be able to "get in touch" with what we design. Shapeways is a great experience for me as a customer, they are really customer friendly, fast and enthusiastic about what they are doing. It's pretty refreshing after what I have been used to. 6Stars out of 5 for you Shapeways!

Subject: Re: Wall thickness check without ordering?
Posted by [woody64](#) on Tue, 20 Oct 2009 19:43:15 GMT
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I'm recently also a victim of the wall thickness problem.

But in my case it affects designs which were already printed successfully.
So shapeways does a new test before printing which wasn't done before?
Is this test now done by the printer software or also by an extra tool?
If an extra tool does this test then maybe it can do it automatically and report problems before ordering.
(I seldom do ordering immediately)

Also I face the problem that items I have ordered and which are proven from my point of view are now reported as too thin when other guys are requesting them. That's a little problem.

Also I don't know where the problem is which costs a lot of time for finding and correcting.

Also thanks to WiKKiDWidgets for explaining these things.

But I got also objects reported as too thin which are completely solid?

Woody64

Subject: Re: Wall thickness check without ordering?
Posted by [lorddarthvik](#) on Tue, 20 Oct 2009 22:34:35 GMT
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I have also received about one of my most successful models an email about 2 months ago that it was ordered but cannot be printed, its too thin. Now thats just strange, cos I was selling that modell for about 8 or 9 times for almost a year now, without any problems. I even received a comment that it was actually working (turbine spinning).

I've asked why, what was the problem, and where, but the answer I received weeks later was that they won't produce it anymore because if it breaks it ruins the whole bunch of models around it. I won't go into this any further, but I'm sure in the WSF process there is no way that could happen... ehh, anyways, it would be nice to get that checking software, or at least a simplified part of it, if they are using a new/better one.

Checking along the model in max with a 1x1x1mm cube is kinda long and not the most exact way to measure things.

Subject: Re: Wall thickness check without ordering?
Posted by [woody64](#) on Wed, 21 Oct 2009 04:48:37 GMT
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The same happend to me for already printed/tested objects.
I got the information that the printing departments declines objects based on previous troubles?

But that means that they handle a "black list" ?

The above given explanation is fine but I'm sure that some objects declined are solid. So it seems to work in another way.

To my point of view shapeways should announce somebody how corrects this process:

- opening a managed(!) thread for discussion
- explaining the process and how it works
- discussing how we can correct these objects
- searching for a solution doing this test when uploading
- reporting the current status and the planed next steps
- doing this test for already existing objects to ensure that the problems are not first visible when a customer orders

....

Woody64

Subject: Re: Wall thickness check without ordering?
Posted by [dadrummond](#) on Wed, 21 Oct 2009 04:54:31 GMT
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It might be useful to post a few models that Shapeways has rejected due to wall-thickness issues but that seem to be fine. If the community agrees that the models are okay, then Shapeways should take another look (and it seems like they'd be happy to).

Subject: Re: Wall thickness check without ordering?
Posted by [woody64](#) on Wed, 21 Oct 2009 20:23:40 GMT
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I'm still confused by the way how it's done.

If we take a look on the model below which is complete solid.
If we have a primitive like a cone. At the end each cone is less then the wall size?

But to the explanation above it should be a detail?

So far I had a lot of these parts. Are this parts now all impossible?

Woody64

Subject: Re: Wall thickness check without ordering?
Posted by [joris](#) on Thu, 22 Oct 2009 13:02:49 GMT
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The new sticky, always on top, awesome Wall thickness thread:

<http://www.shapeways.com/forum/index.php?t=msg&goto=7408>

Subject: Re: Wall thickness check without ordering?
Posted by [woody64](#) on Fri, 23 Oct 2009 05:41:48 GMT
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Currently I have more then 6 items rejected with the comment wall thickness. Now I have some corrections and need to know if I'm right.

So I can upload them, but only to make a test print. As long as all the problems are solved. Then I want to order.

I another thread I asked for a test print feature for designers where you:

- don't need to reach the \$25 border
- there's no send
- there's some report (like a picture)
- maybe a common send with the next real order.

Woody64

Subject: Re: Wall thickness check without ordering?

Posted by [crsdf](#) on Fri, 23 Oct 2009 06:21:22 GMT

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WiKKiDWidgets wrote on Fri, 05 June 2009 20:49

A little further explanation.

Got it in one! Nice job bud. That is exactly how the printers work - including the intersecting geometry. The printer knows not to sinter the same area twice on a single layer, as you'd expect with two intersecting shells. It 'considers' it one object.
