
Subject: Thin Walls

Posted by [joris](#) on Thu, 22 Oct 2009 12:59:45 GMT

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As per Woody's suggestion I'm opening up a topic here for you to discuss your thin wall issues.

The wall thicknesses per material:

White, Transparent & Black Detail: 1mm

White, Strong & Flexible: 0.7mm (I would personally always keep to and recommend 1mm).

Cream Robust: 1mm

Stainless Steel(depends)

There are a number of issues with regards to wall thickness:

1. Our filters are not good at checking them at the moment so your model might upload OK but once it is ordered we might still reject it.
 2. Some models that have successfully been printed previously are currently being rejected due to thin walls.
 3. With Stainless Steel it is difficult to determine wall thickness and if the model will print ahead of time.
 4. It is difficult to measure wall thickness in a lot of modeling tools.
1. We are improving our filters and will get a major update to the wall thickness filter within two weeks. Additional updates will follow and each will make the problem a little less likely to occur.
 2. We apologize for rejecting previously printed models. We should have communicated this better and in advance. We should also have been clearer to you. We screwed this up.

What has happened is the following: initially we were very experimental and wanted to help everyone push the envelope of 3D printing. We therefore printed models that might fail and happily printed them a few times if they did fail. We tried until we got it right and then sent that model to the customer. As more and more orders flowed in this became more and more difficult to do. A failed model is another process, another set of steps that one person has to undertake. These experimental models cost us money in the extra hours in materials and handling spent on them. They disrupt the normal flow of things from digital to your object. Production people gradually started to become more stringent on the 'printability' of a model. This to keep the ever increasing torrent of orders flowing to you. There are only so many hours in a day and they chose the path of getting the most orders out of the door in time. At the same time we generally became less adventurous and experimental. Whereas initially we were focused on pushing the envelope,

we are now more focused on process optimization and keeping costs down. The goal after all is to make 3D printing as inexpensive as can be. To eventually turn 3D printing into a technology that everyone can use to make everything. Before we were completely aware of it we were rejecting models that we should not have rejected and becoming too boring. We don't want to be boring.

Over the coming two weeks we will reevaluate our criteria for accepting and rejecting models. We will strive to find the right balance between the optimal process and pushing 3D printing forward into the unexplored. We apologize for our poor communication on this matter.

3. Stainless Steel is a new material and process, there are no design rules. By Saturday I will put a tutorial live giving you a more in depth look into what will and will not work with Stainless Steel. This process however is likely to remain a 'hit or miss' one for some months. I hope however to give you significantly more clarity and information.

4. We are currently evaluating several tools that you can use to check wall thicknesses. Once we are done testing them we will do a blog post about the tool(s) that is(are) up to spec. I hope to be able to do this by Saturday but can not be sure.

To sum up:

by November 4th we will have a new wall thickness check live for you that will help in ameliorating this problem.

By November 4th we will have reevaluated our rejection guidelines and hopefully struck the right balance between experimenting and cost.

By October 24th I will publish more information about the Stainless Steel guidelines.

Hopefully by October 24th we will have completed evaluating a suitable tool for wall thickness checking.

If you have a wall thickness issue, tell us about it below. Also, if you have any ideas, or concerns that we have not addressed, please tell us also.

Joris



Subject: Re: Thin Walls

Posted by [woody64](#) on Thu, 22 Oct 2009 17:21:15 GMT

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High,

thanks for starting this discussion.

1. It would be very helpful if the designers knows which old models are in danger of being rejected next time due to too thin walls.

Is this information available?

2. Is there a guide how to deal with such objects:

<http://www.shapeways.com/forum/index.php?t=msg&goto=7393>

If an object has a peak then that results always in a thin wall at the end. Correct or wrong?

3. If rejected then a written advice where to search for the thin wall would be helpfull. Or does the printer software give an exact report/picture?

Woody64

Subject: Re: Thin Walls

Posted by [dadrummond](#) on Thu, 22 Oct 2009 18:53:06 GMT

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Great to see this thread opened! Joris, I really appreciate the way you addressed things above, and the way Shapeways is thinking about the issue. I'd like to add my voice to the clamor for clarity.

To me, the most difficult concept is distinguishing between the detail resolution of the machine and the minimum wall thickness. I still cannot tell you what constitutes a wall.

One can imagine a precise definition of thickness, as follows: Take an imaginary sphere of diameter $X = \text{minimum thickness}$. If it is possible to position the sphere inside any solid portion of the model, tangent to any inner surface (that is, opposite the outer surface normal), and have any point on the sphere lie outside the model, then the model violates the thickness condition. If this inner-tangent sphere always lies inside the model, then the model satisfies the thickness condition.

The problem with this definition is that it refers to thickness, not wall thickness. Because the nominal resolution of the machines in question is more like 0.1mm, presumably the rule is not designed to forbid details below the wall-thickness limit. The question is, what's the difference between a "detail" and a "wall"?

What would help me (yet another wall-thickness rejection victim) is:

1) A precise, preferably algorithmic definition of wall thickness, similar to the thickness definition above. In other words, what is Shapeways checking? The tools Joris refers to are surely part of that solution. The definition should also be provided. I don't want to just build my model and then check it with a tool -- I want to design appropriately from minute 1.

2) Pictures! Along with such a precise definition, lots of "good -- bad" comparative pictures, preferably of the same model before and after, will help train our brains to recognize wall thickness issues, and distinguish them from appropriate detail, before they're submitted.

Subject: Re: Thin Walls

Posted by [coines23](#) on Thu, 22 Oct 2009 19:31:43 GMT

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I'm glad to see this thread too, since it hit a number of my models as well. In conversing with Ralph, I got some screen shots of trouble areas on my model which helped me find areas where I made a mistake, and where I think it was throwing a false positive. The attached image shows both. The 0.200 mark is indeed too thin, so I've fixed that, but the 0.198 mark is from a panel scoring line similar to those on model planes, which while being about 0.2mm wide, is also only 0.1mm deep.

File Attachments

1) [STL_56181.jpg](#), downloaded 521 times

Subject: Re: Thin Walls

Posted by [Inlite](#) on Thu, 22 Oct 2009 22:00:35 GMT

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I have had many many models cancelled due to wall thickness issues, despite trying to keep everything within the parameters, the problem I have is that unless we are told which parts of the model are under thickness then I could spend hours remodeling and still not get the specific part that is preventing the print from going ahead.

Also, I would like to see if there is a chance of getting "experimental" parts printed - meaning, I pay for them and Shapeways prints them with the understanding that if the print fails then I get sent whatever came out of the machine and I accept that I cant ask for a reprint/refund.

Subject: Re: Thin Walls

Posted by [stannum](#) on Fri, 23 Oct 2009 01:26:17 GMT

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Yep, I'm all for some kind of "experimental path" too. Otherwise there is no way to submit test models and see where they fail. And not only where, but also how. Does it become a blob? Does it look like a cheese full of holes? Is the modelling approach giving the desired texture? Can it work when printed in any direction? Does a basic shape need more polygons? Is that zone wasting polygons that do not make it any smoother? Is X or Y shape the best one to imitate whatever real thing, when working at so small scale? Does it still work for double size version or better use Z shape in that case? And so on.

My experiment was a group of things, placed multiple times over support plates, in a try to see how things would work out in multiple orientations (I read some blog posts about that), and how simplified or detailed modelling would transfer to the final object or how many failures would happen. I got busy with other things and postponed it altogether after the cancelation, but a friend "managed" to print it in a ZCorp and I got pictures of how it failed, so now I know what problems I would have with those machines, and what would work. The conclusion was that system is not usable for what I want, too rough surfaces, and too brittle before applying cyano. The model failed, but the test "worked", basic "try and error engineering".

I would like to get back to the project, it was a pet project for the time being... but multiple upload and reupload trying to figure what was wrong with magic "non manifold" (yeah, right... STL or the printer software fusing vertices: I had to debug by uploading a part and then adding other more until I realized what was really going on) and then 2 weeks to get an sparse "not printable" wasn't very encouraging.

Subject: Re: Thin Walls

Posted by [dadrummond](#) on Fri, 23 Oct 2009 04:04:58 GMT

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Another key reason for the "experimental" path is the need for prototyping in a less-expensive material.

I have a model -- my only model so far -- which I am designing to be printed in steel. However, this is a project with many phases, and I can't afford steel for all the prototypes along the way. Therefore, having spent the money to learn that steel beats the resolution of white detail (see here), I'm printing my prototypes in the detail material (black, under the assumption that the material properties of black approximate that of white, and knowing that details printed in white detail can be difficult to see).

I accept that black detail is not equivalent to steel, and I understand that there will be defects in the black detail print. What I want is 1) a way to tell Shapeways "print this, I'm trying to learn about proportions and connections and things that are difficult to see on a 2D screen", and 2) some assurance that, if there are gross printing defects unrelated to my design, Shapeways' exemplary customer service will still come to my rescue.

In short -- we should be allowed to print prototypes of future steel prints in WSF, and all that implies.

I believe this problem can be solved with a suitably worded page during the ordering process:

"WARNING: Your model violates one or more standards for printing in this material. In all likelihood, the print will show gross defects. By clicking 'OK' below, you confirm that you will accept whatever our printer emits, no questions asked, no complaints, no whining, no nothing. You are using our services for your own experimental ends. Good luck!"

Subject: Re: Thin Walls
Posted by [woody64](#) on Fri, 23 Oct 2009 05:47:41 GMT
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Currently I have more then 6 items facing this problem.

I'm working on a solution but still don't know the exact criterias.

I another thread I asked also for a test print for designers:

- no \$25 minimum
- no send
- only a report in kind of photo
- possible send with next normal order

Woody64

Subject: Re: Thin Walls
Posted by [joris](#) on Fri, 23 Oct 2009 07:27:52 GMT
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I will try to answer all questions in one post, should be interesting.

Woody:

1. It would be very helpful if the designers knows which old models are in danger of being rejected next time due to too thin walls.
Is this information available?

We can calculate it but it would take some time to build the reporting tool and set up a way to communicate it to everyone. And it would take some time to go through the entire database. Good idea though, I'll see if we can do it.

2. Is there a guide how to deal with such objects:
<http://www.shapeways.com/forum/index.php?t=msg&goto=7393>

There is a wall thickness tutorial. <http://www.shapeways.com/tutorials/3dprintingminimumwallthicknesstutorial>

If you guys haven't seen it, I'd like to know if it answers some of your questions. I do believe that it does not completely illustrate the difference between a peak and wall. I will improve it.

If an object has a peak then that results always in a thin wall at the end. Correct or wrong?

I will first look into the matter more deeply before answering.

3. If rejected then a written advice where to search for the thin wall would be helpfull. Or does the printer software give an exact report/picture?

Currently the software just finds that the model is too thin. So there is no visual tool to help you find the thin walls.

dadrummond

1) A precise, preferably algorithmic definition of wall thickness, similar to the thickness definition above. In other words, what is Shapeways checking? The tools Joris refers to are surely part of that solution. The definition should also be provided. I don't want to just build my model and then check it with a tool -- I want to design appropriately from minute 1.

I like your definition but want to be absolutely 100% clear before I respond.

2) Pictures! Along with such a precise definition, lots of "good -- bad" comparative pictures, preferably of the same model before and after, will help train our brains to recognize wall thickness issues, and distinguish them from appropriate detail, before they're submitted.

I will see if we can add them to the tutorial.

coines23

Thank you for convincing me that the picture idea is a good one. Your (and dadrummond's) answer has also made me super careful in responding about the wall thickness definition. I will work on this.

Inlite

the problem I have is that unless we are told which parts of the model are under thickness then I could spend hours remodeling and still not get the specific part that is preventing the print from going ahead.

With the tools we are evaluating this should be very easy to do, for most models. The plate of spaghetti model will always be complex.

Also, I would like to see if there is a chance of getting "experimental" parts printed

This is an option but would require an extra process for us. Also in some cases a misprint could screw up other models. I'll look into this to see if it would be possible

stannum

I understand that belatedly getting a wall thickness error is a bad thing. I also want to reiterate that we want to encourage and make experimentation possible.

dadrummond

In short -- we should be allowed to print prototypes of future steel prints in WSF, and all that implies.

Since each process is very very different in terms of detail, wall thickness and printing issues a WSF part does not say much about a final Steel part.

But, I do believe in iterative design and in making it possible for people to prototype in series inexpensively as well as print out a final product.

I believe this problem can be solved with a suitably worded page during the ordering process:

This is a good idea.

Woody

In another thread I asked also for a test print for designers:

- no \$25 minimum
- no send
- only a report in kind of photo
- possible send with next normal order

This is also an interesting idea. I'll look into it.

Subject: Re: Thin Walls

Posted by [woody64](#) on Fri, 23 Oct 2009 13:51:49 GMT

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The tutorial only describes the rough basics.

WiKKiDWidgets tries to explain the difference between detail and wall. But I think it's not aligned with the tutorial.

It would be a good point to follow this explanation and to give a statement from shapeways point of view.

I've started to upload corrections for some of my items. How can we go on?

Do I have to order them, or do you have another proposal.

Woody64

Subject: two blender methods for thickening walls

Posted by [dadrummond](#) on Sat, 24 Oct 2009 04:26:49 GMT

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Just a quick tip for Blender users with thin walls: expanding along normals is your friend.

If you have a relatively irregular but subdivided and smooth object that's too thin, consider two strategies:

1) Easy. Select your object, go to Edit Mode (Tab), select all vertices (A, or A,A until all vertices are selected), then expand along normals (Alt-S). This will "puff up" your object. If you have deep creases in the object, the expanded geometry will overlap and you'll need to touch these areas up.

The disadvantage of this method is that it distorts geometry on all sides. Hence:

2) Hard but geometry-preserving on one side. If your object has an outside wall whose aspects are carefully designed and an inside wall that you don't care about -- I'm thinking here of something like a coat-of-arms shield with designs on the outside and nothing important on the inside -- this may be a better method. Select your object, go to Edit Mode (Tab), Face Mode. Now move your view until you're looking at (normal to) the inside wall, the wall you'd like to thicken by moving it toward you. Go to freehand select mode (B,B) and select all the faces that are facing you -- but avoid selecting those faces at the edges that curl over toward the outside surface. (If you do select some of them by accident, B,B,MMB or shift-RMB to deselect them.) Now Alt-S (expand along normals) as before, and thicken the inside faces selectively. If you don't like what you see, ESC (or Undo) and deselect the faces that seem to be causing problems. Save often -- Blender save selections!

The obvious solution might seem to be scaling your object along some axis. If that works for you, do it! But often (I find) scaling produces results that completely distort key geometry. The strategies above will thicken pieces while preserving at least some underlying geometry.

Hope this helps.

Subject: Re: two blender methods for thickening walls
Posted by [joris](#) on Sat, 24 Oct 2009 07:38:23 GMT
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OK everyone,

There is a blogpost live about Netfabb it is a great tool to measure wall thicknesses, and it might automatically repair things such as inverted normals, non-manifolds and holes:

<http://www.shapeways.com/blog/archives/312-Netfabb-is-an-awe-some-STL-viewer-repair-tool.html>

I've also put the initial design information about the Stainless Steel process live:

<http://www.shapeways.com/blog/archives/313-Initial-Design-ru-les-Stainless-Steel-3D-printing.html>

I am still waiting from permission from some model owners to use renderings of their models, hopefully that will make things clearer.

Please tell me what you think of both blogposts.

Woody,

I am making sure we give the right answer before we respond.

Subject: Re: two blender methods for thickening walls
Posted by [stannum](#) on Sat, 24 Oct 2009 19:32:44 GMT
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You can "puff down", Alt+s is shrink/fatten, so use the shrink effect to get a smaller inner shell. Requires flip normals afterwards. The issue is converting the Blender factor to mm, as the operation will not be even all over the shell. I just tried with the monkey head, different thickness in different zones.

Subject: Re: two blender methods for thickening walls
Posted by [woody64](#) on Sun, 25 Oct 2009 19:42:27 GMT
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There's also a nasty problem with all the items customers get denied. All of them were verified from me by ordering them myself to make sure it works. Now I have to redesign them and also to reorder them a 2nd time on my costs. How will you deal with that at shapeways.

Woody64

Subject: Re: Thin Walls
Posted by [Designmodeller1](#) on Thu, 29 Oct 2009 01:51:58 GMT
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Hi all, I too have had a few models rejected due to thin walls.

Some of my designs (jewelry) are small to begin with and overall structurally sound but some contain details (like flowers) that have pedals with tips smaller than .7mm. I understand the need to reject a part for the risk of the part being weak and fragile but are rejections also based on "expected" detail levels?

For example I know the part is strong enough to "hold up" on it's own but It will surely lose some of the details, and if loss of detail is OK with me and I understand that it will occur, (and will not expect refunds) Is there a way that I can still get the model printed?

As designers exploring a new medium I think we all know that there will be problems with our designs but if we can't see our failures how are we supposed to adjust/fix our design methods?

Perhaps there could be a way for those of us that are OK with the potential hazards and risks of loss of details and failures could "sign up" on a list. This could be a "print anyway" list of designers with the understanding that what we get is what we get, good or bad, try to print once only, no refunds.

A experimental "sign up" list would prevent Shapeways from having to re-print a model over and over again to try and get it right and also give designers the opportunity to push the envelope.

Subject: Re: Thin Walls

Posted by [joris](#) on Thu, 29 Oct 2009 08:39:11 GMT

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Woody,

With regards to this re-designing it would depend.

If the model is truly too thin, too fragile then you will have to re-design it.

But, if the rejection is based on us being too careful then you should not have to. I'd suggest that you email us the links to all the models that you are thinking of re-designing and we look at them once more.

Designmodeller1,

Such a list feature is a good idea. We are considering something like that.

Subject: Re: Thin Walls

Posted by [BillBedford](#) on Fri, 30 Oct 2009 11:28:52 GMT

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Quote:What has happened is the following: initially we were very experimental and wanted to help everyone push the envelope of 3D printing. We therefore printed models that might fail and happily printed them a few times if they did fail.

I would much rather receive broken parts so that I can make adjustments to my drawings. After all I am the one who knows what the part should look like and where compromises can be made.

Subject: Re: Thin Walls

Posted by [joris](#) on Fri, 30 Oct 2009 11:32:59 GMT

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Bill,

Thanks for giving another view to the testing idea.

Shipping is expensive for us though.

But, what several people are saying is that they would not need re-prints?

Joris

Subject: Re: Thin Walls

Posted by [BillBedford](#) on Fri, 30 Oct 2009 11:50:01 GMT

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joris wrote on Thu, 22 October 2009 12:59As per Woody's suggestion I'm opening up a topic here for you to discuss your thin wall issues.

The wall thicknesses per material:

White, Transparent & Black Detail: 1mm

I'm am not sure that I understand why this wall thickness is so conservative. I am trying to model some loco wheels where the full size examples where 5 or 6 feet diameter and the web between the boss and rim, because it was corrugated and reinforced, was only about 1/4 inch (6mm) thick. I don't expect to be able reproduce exactly that in 1:76 scale but I would expect something much thinner than 1mm (say 0.2. or 0.3mm) to be robust enough to survive manufacture.

Subject: Re: Thin Walls

Posted by [BillBedford](#) on Fri, 30 Oct 2009 12:04:49 GMT

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joris wrote on Fri, 30 October 2009 11:32

But, what several people are saying is that they would not need re-prints?

Yes, My view is that if I don't follow the rules then I should take the responsibility for the failures. This is how most of my other suppliers (casters and photo etchers) work. But this will only be useful if I have the failed pieces sent to me.

Whether you would want to take on the extra support of explaining why models fail is a completely different question.....

Subject: Re: Thin Walls

Posted by [joris](#) on Fri, 30 Oct 2009 12:19:49 GMT

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Bill,

A part of the wall thickness issue is simply a constraint of the process and the machine.

A printing head has to deposit material and this material must be surrounded by support material. The size of the drops, laser, extrusion nozzle etc. all have a minimum thickness. Any thinner and the structure collapses, the wall has holes etc.

These wall thicknesses are hard limits of the process itself. Over time they will improve.

But, as people have stated there is a difference between walls and details.

Where we made errors is in becoming too stringent in applying these and higher standards to adventurous models.

A wall is any structural element of your model.

So lets say you're printing a porcupine. The spines of the porcupine would have to be 0.7mm thick at least(in White, Strong & Flexible). For such a structure I would even recommend 2mm. Any thinner than 0.7mm and the pins simply would not print properly. Thicker than 0.7mm they should print but might be fragile. 1mm would be stronger, 2mm stronger still.

But...the spines each have a very fine point at the end of them. This is a detail and could be finer

and thinner than 0.7mm. Because this detail is not a structural element the printer will simply try its best and then leave a tapered off end. This is similar to what happens with corners, edges etc.

So lets look at Laurana: http://www.shapeways.com/model/7842/laurana_50k_cropped___shelled.html

The entire structure is a wall. This simply could not be any thinner or it would fail. The eyebrow is thinner at the very end, this is a detail.

Anything that if removed would cause a hole to appear in your model or mesh is definitely a wall.

Anything that can be safely removed in and of itself without creating a hole in the mesh is most probably a detail.

Details taller than 1mm, are walls.

Subject: Re: Thin Walls

Posted by [BillBedford](#) on Fri, 30 Oct 2009 13:44:05 GMT

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Joris

Sorry, but in a passed life I used to help design ships, so I have a basic understanding of structural engineering, though I have forgotten all the maths.

Now the interesting thing about a large ship is that the plating on the outside is vary, very, thin compared with the volume that it encloses, but that there is a system of structural members inside the plating that supplies the structural integrity.

So applying this you our models, we could build a lattice out of robust members without any problem. If we then added a thin sheet to one side so we had a series of open boxes we could still print it if the sheet was thick enough. The problem is that there is nothing that I have read that gives me a clue about how thin I could make this sheet. I know this will be complicated because the further apart the lattice members are the thicker the sheet needs to be. Also the span of any particular thickness that could be supported would depend on the size of the lattice members as well as the distance between them. Would I be right in thinking that the thinnest possible

dimension of this sheet would be close to the minimum feature size?

Software that only measures arbitrary minimum thicknesses will always give false negative in cases like our lattice, unless structural integrity is taken into account.

Subject: Re: Thin Walls
Posted by [joris](#) on Fri, 30 Oct 2009 13:59:34 GMT
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Bill,

I seem to not be explaining myself correctly.

I'm sorry for being confusing.

The thinnest the sheet could be is the minimum wall thickness. The thinnest the lattice could be is the minimum wall thickness.

The printer in principle can not make anything thinner than the minimum wall thickness.

However a detail such as a sharp point can be produced because the printer simply gives up at one point leaving some of the point intact.

An edge of an eyebrow could remain but if a wall would have the same thin features it could not be produced.

Sorry for using words like 'structural element.'

What I'm trying to say is if you're trying to stack golf balls one on top of another your structure would at minimum be one golf ball in width. You can not stack half a golf ball. This golf ball width is the minimum wall thickness.

And yes, if you look closely at some points on the stack of golf balls you can see that the width is less than one golf ball. But, if you'd want to add a layer to your golf ball stack you can not add half a golf ball. You can only add one golf ball.

Subject: Re: Thin Walls

Posted by [BillBedford](#) on Fri, 30 Oct 2009 14:59:52 GMT
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Joris

Now I really don't understand what is going on as I have a lot of white detail pieces where the minimum size is about 0.6 x 1.1mm.

Unless, of course the minimum wall for white detail is really around 0.5 or 0.6.

Subject: Re: Thin Walls
Posted by [afrodri](#) on Fri, 30 Oct 2009 17:10:14 GMT
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I'm still somewhat confused about the "structural" definition. Is the goal to make the object structurally sound in the "will not fall apart under its own weight and/or shipping" sense, or is the issue "will it survive the compressed air post processing"?

For example, the three objects below:

Assume the blue material is 1mm x 1mm in cross section, and we are using WSF. The object on the left should be acceptable, as no subcomponent is less than 1mm.

The structure in the center adds a red piece which is .5mm x .5mm. Adding this piece only increases the overall structural strength, but the red piece - by itself - is small and potentially delicate.

The structure on the right has the red piece "exposed" and not braced against other components.

Which of these would be printable?

File Attachments

1) [wall.jpg](#), downloaded 5503 times

Subject: Re: Thin Walls
Posted by [woody64](#) on Fri, 30 Oct 2009 19:13:59 GMT
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Today I received another "walls to thin" hint.

The difference was, that there was a photo added which points at the troubled places.

In this case I made the error since the object was only designed fro white and flexible, but to thin for others.

This leads me to the proposal of storing the minimal wall size of an object and restricting the materials for printing:

An element < 0,7 has no materials

elements between 0,7 and 1 only white and flexible

elemnents between 1 and 2 only

That would save a lot of troubles. Is that considerable?

Woody64

Subject: Re: Thin Walls

Posted by [coins23](#) on Thu, 05 Nov 2009 01:12:46 GMT

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I've got time to work on 'em now, so I've started replacing my Not For Sale models in my shop. Two down, three to go...

I'd appreciate it if you'd glance over this one:

http://www.shapeways.com/model/56589/jovian_schild_class_esc_ort_cruiser.html

before I work it over, since it shares a lot of geometry with this older ship here:

http://www.shapeways.com/model/30103/jovian_lanze_class_strike_carrier.html

That one has been successfully printed very recently.

Subject: Re: Thin Walls

Posted by [BattlegroundToys](#) on Sat, 21 Nov 2009 13:20:31 GMT

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While I greatly appreciate that what you guys are telling us, and your efforts toward educating us to build better drawings, I would have to fully agree that there should be a way for the customer to request that the model be printed anyway. With such a request, you give up your rights to a reprint, unless you pay for another one.

The other thing that I've struggled with is that my most recent experiences have been with a

model that has already been printed successfully and was then later rejected on a subsequent printing request.

I realize that the process is evolving, but this was a big surprise and now instead of sending out product I'm back at the drawing board.

Again, you guys (the fantastic Shapeways team, Joris and Bart rock!) are doing a great job helping us all figure this out, but sometimes we just need to get something done.

Subject: Re: Thin Walls
Posted by [woody64](#) on Mon, 30 Nov 2009 17:44:56 GMT
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Does anybody know an actual status?

Is there now a check done after/when uploading?

Do we get a hint where the problems are.

Is there a correct description of "detail" and "wall" now.

Are the old models checked, to prevent that another customer buys an item and get the response walls too thin.

If not. Is it guaranteed that the designer and the customer come into contact to check corrections possibilities?

Woody64

Subject: Re: Thin Walls
Posted by [EricFinley](#) on Tue, 08 Dec 2009 17:08:08 GMT
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Seems to me like there should be a simple solution. If you want your piece printed "Best Effort" then it goes into a pile of similarly flagged pieces; once there's enough Best Effort pieces for a full

run, do one with just those.

This means that if you flag Best Effort you are accepting not only that you might have made a mistake, but there's a chance that someone else might have designed a piece which breaks the design specs and ends up messing up yours. [I don't know how likely this is; if Joris or someone wanted to weigh in with that data, that'd be helpful. It seems unlikely, at least in the SLS method.]

I'm guessing that there would in fact be enough of those that the Shapeways team would end up running one or more such batches per day - I don't know for sure. Presumably, if this is not the case, then Best Effort may also mean that you have to wait until a full batch is going to run, so the usual ten-day guarantee won't apply either. Wouldn't expect it to be a big deal, though.

So - add a checkbox for "Best Effort" to the upload page (with a "What's This?" popup explaining the terms). Checking this means that if your design uploaded successfully, it will go to print - when there's time and enough other Best Effort pieces stacked up. And you'll receive the result, whatever the result is. But it will be at risk from more than your own errors; that's the price you pay for having it bypass the checking process.

Subject: Wall checking software, was: Thin Walls
Posted by [BillBedford](#) on Wed, 16 Dec 2009 11:05:19 GMT
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Does the new wall checking software find all instances of thin wall or is it stop after the first few have been found?

Subject: Re: Thin Walls
Posted by [EricFinley](#) on Thu, 17 Dec 2009 17:42:12 GMT
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Bill - unless I'm mistaken, there is no automatic wall checking software. The feedback I've received has always looked like someone manually looked at the design and identified the thinnest parts, and then measured them.

As it happens, though, I'm 90% done a Blender script which will in fact automatically check wall thicknesses... which is then 50% of a second script I have planned, to automatically fix them too. It's slightly approximate, but should be much better than visual inspection (and faster too). I'll be posting a link to the script in these forums as soon as it's ready, I promise - should be within a few days, could even be today.

Subject: Re: Thin Walls

Posted by [BillBedford](#) on Thu, 17 Dec 2009 18:49:18 GMT

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Eric Finley wrote on Thu, 17 December 2009 17:42Bill - unless I'm mistaken, there is no automatic wall checking software. The feedback I've received has always looked like someone manually looked at the design and identified the thinnest parts, and then measured them.

Great! More arbitraryness.

Subject: Re: Thin Walls

Posted by [dadrummond](#) on Thu, 17 Dec 2009 19:29:35 GMT

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Just wanted to suggest that we give SW a bit of a break, here.

The "arbitrariness" should not be entirely (or even mostly) blamed on Shapeways. Wall thickness causes problems because of a) the laws of physics, b) the realities of handling during the printing process, and c) the capabilities of present-day printers.

a) Physics. You can easily model something that can't support its own weight. If you think that a manual check is arbitrary, please suggest any non-arbitrary way to predict -- without actually printing your object first (too expensive!) -- that it will or won't collapse even if left on its own. Humans are imperfect, but can assess whether objects are likely to collapse, bend, or chip better than a script. Unless you know of a script I'm missing.

b) Handling. Let's say you've written a decent finite-element analysis tool that can determine whether an object will support its own weight. Now: does it properly simulate the stresses when an object is lifted out of the printer, packaged, and shipped by UPS? Does the metal-print simulation properly simulate the un-infiltrated "green" state and the pinch of tongs reaching around the object? Etc. etc. Here, a well-informed human is your best bet.

c) Printers. Very tiny features can cause problems which can disrupt an entire print run. The basis of SW's business -- the reason their prices are so low -- is the ability to print many people's objects in one run. Printer-related model problems are probably most amenable to automated script detection.

I'm sure SW is deeply interested in reducing the arbitrary nature of some of the checks. Perhaps a fuller appreciation of the extraordinary difficulty of automating these checks would improve our patience and happiness. This process is really the difference between modeling stuff in your computer (almost anything is possible) and making it real (most things you can design are not printable).

Reality is arbitrary. The checks are primarily reality checks. There is no such thing as an automated reality check, and there won't be for a good long time.

Subject: Re: Thin Walls

Posted by [BillBedford](#) on Thu, 17 Dec 2009 20:04:39 GMT

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dadrummond wrote on Thu, 17 December 2009 19:29 Reality is arbitrary. The checks are primarily reality checks. There is no such thing as an automated reality check, and there won't be for a good long time.

The accusation of arbitraryness comes from having bags full of pieces that have been printed but now fall foul of the minimum thickness rules. Almost all the professional suppliers (casters, photo-etchers etc) I have deal with supply me with pieces that have failed so at least I know what when wrong and I can design around the problem.

Subject: Re: Thin Walls

Posted by [GHP](#) on Thu, 17 Dec 2009 22:09:47 GMT

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One of my Snowflake balls was rejected for thin walls, apparently because the text on the bars was too thin. When I pointed out that the text should print as part of the bar, adding its thickness to that of the bar, I was told that the text was "loose" and would fall off. The text was done as a separate mesh (or meshes), but it is immediately adjacent to the bar, so I would expect them to fuse together. Am I misunderstanding how the technology works?

Another Snowflake ball, ordered by Robert Schouwenburg and done exactly the same way (but with different text), is now in production, having apparently passed the printing checks.

Subject: Re: Thin Walls

Posted by [BillBedford](#) on Thu, 17 Dec 2009 22:36:26 GMT

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GHP wrote on Thu, 17 December 2009 22:09 One of my Snowflake balls was rejected for thin walls, apparently because the text on the bars was too thin. When I pointed out that the text should print as part of the bar, adding its thickness to that of the bar, I was told that the text was "loose" and would fall off. The text was done as a separate mesh (or meshes), but it is

immediately adjacent to the bar, so I would expect them to fuse together. Am I misunderstanding how the technology works? I think you have just found one of the universal laws of unintended consequences. If you want to make two part that intersect but do not fuse you have to have a bigger gap that you would really like, but if you really want the two part to fuse they will always separate.

In general, if you want to build something without moving parts it should be a single mesh.

Subject: Re: Thin Walls

Posted by [dadrummond](#) on Fri, 18 Dec 2009 02:42:49 GMT

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Hi GHP,

I think you just need to not build models that rely on fusing of adjacent parts. If you want two meshes to print as a single object, you must explicitly overlap them in space.

That is, even though two parts are 0.3mm apart, which will cause them to print as a fused object due to the statistics of the printer's resolution, SW will not allow you to claim that this printer-error-induced connection constitutes a real structure. (I hope you would agree -- what if the printer actually does what your model specifies, by chance! Yikes!)

When modeling for SW, I create virtually every part with a separate mesh. (Here I must respectfully offer the opposite advice from BillBedford.) In my Scarab and Scarab 2 models, there are more than 20 separate meshes, each carefully overlapped to create a continuous solid object. The downside of this is that I pay a bit more because overlapping material is double-counted by SW. Currently, they compute cost by summing the volumes of all meshes as an approximation to the true total material volume.

The upsides are: first, and most importantly, I can adjust each segment of the beetle independently just as if it were a real creature, which has helped enormously with the model refinement process, allowing me to quickly turn Scarab 1 into Scarab 2. Second, I'm lazy, and Boolean algorithms in Blender still frequently produce non-manifold problems that I hate debugging as much as anyone. No Booleaning at all in these models. (I did print signet rings for me and my girlfriend that used a rather elaborate Boolean difference operation to create the stamp portion. Worked fine, but it took forever to fix the non-manifold problems.)

So, my advice: act as though the printer will do exactly what you tell it to, and don't rely on its errors to produce solid models. Use explicit overlaps if you like, or unify your meshes. Both work. The former is more expensive and requires more thinking but is more flexible if you intend to make major changes to the model; the latter is maximally cost-efficient and foolproof but can

somewhat inhibit editing later.

Subject: Re: Thin Walls
Posted by [GHP](#) on Fri, 18 Dec 2009 03:33:28 GMT
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But the text and the bars weren't 0.3mm apart, or even close to that (I believe). I mapped the text onto the surface of the sphere outlined by the twisted bars, so there should only have been some very tiny gaps due to computational error.

On the other hand, I guess I did do some smoothing on the bars, which may have reduced them a bit. Just to be safe, I am now mapping the text onto a slightly smaller sphere.

Thanks for all your advice.

Gillian.

Subject: Re: Thin Walls
Posted by [pete](#) on Sun, 20 Dec 2009 16:37:52 GMT
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Hi Eric.

using Blender to do Wallthickness checks? Wow!
We would be interested because it would help in removing the arbitrariness mentioned above.
Today it is indeed manual work.

Do you care to share?

best regards,
Peter

Subject: Re: Thin Walls
Posted by [EricFinley](#) on Sun, 20 Dec 2009 23:34:48 GMT
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Of course! I'm just finishing tinkering with it so that I get a version which is usable by other people

than myself. It works, even now, although my degree of faith in its results is not yet high.

After that, my sincere hope is to toss it to you guys, get you to run it on a whole bunch of known-good and known-bad meshes, and work with you to refine a version which can receive the Shapeways seal of approval - if it passes this, we'll print it.

Armed with that, I think my next project will then be a script which runs the thickness scan, nudges vertices outward in proportion to their degree of violation, and repeats until everything passes. I expect this to be slow - a "start it and leave for work / go to bed" kind of affair - but given the existence of the first script, it should be easy enough to continue on into the second.

Subject: Re: Thin Walls
Posted by [esnnoeijs](#) on Fri, 08 Jan 2010 12:09:37 GMT
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Perhaps this is already answered or is common knowledge but I could not find it.

I once read that if you create a hollow object that is closed, the support material will (obviously) be trapped inside. In such a case, should we still be careful with wall thickness? Or can we treat it as being a single solid when considering wall thickness?

Subject: Re: Thin Walls
Posted by [dadrummond](#) on Fri, 08 Jan 2010 14:22:41 GMT
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You must still worry about wall thickness. Wall thickness restrictions are primarily about stability, secondarily about preventing printer problems. Neither of those issues are helped by trapped support material. HTH...

Subject: Re: Thin Walls
Posted by [Whystler](#) on Sun, 10 Jan 2010 20:32:20 GMT
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Hey there Minimum Wall Thickness Discussion folks!

This new colour material has a minimum wall thickness of 3mm I see. I did some pretty detailed reading about what that means as opposed to a surface "feature".

So my question is ... how does minimum thickness apply to shells? Because there is more stability in a closed or semi closed structure than on a straight or stressed wall, I have noticed in some materials you can sneak in smaller wall thicknesses and have them work. I have, in some cases, gotten away with .5mm walls for shells.

I ask this because:

I'm sure the Bowie Bunny, which is created as a shell, has a less than 3mm thickness. Hold on, I have one in black detail here, I will measure ...

It is somewhere around 1mm thick.

(poor lil Bowie Bunny ... He is now dissected lol. I will order a new one - he is so cute)

Is this also true for the Bowie Bunny that Shapeways folks have advertised as a colour print? It must be, because it doesn't seem that Bowie Bunny solid, or 3mm could be that price. Or could it?

-Whystler

Subject: Re: Thin Walls

Posted by [pete](#) on Mon, 11 Jan 2010 21:14:52 GMT

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@Whystler: You are right it is not *that* black and white. In spheres less than 3mm can be gotten away with, but its a learning curve for us also.

As time progresses we can analyse and improve both our tutorials and our proving tools to allow as many models as possible (which is obviously our goal).

BTW for pictures we scaled the bunny to be a bit bigger

@ dadrummond You are absolutely right. It is about both stability and preventing printer problems. Trapping support does not help.

Peter

Subject: Re: Thin Walls

Posted by [Whystler](#) on Mon, 11 Jan 2010 22:50:13 GMT
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Peter,

Good info.

Is the Bowie the Bunny you printed out in the Coloured Sandstone material, the same as the small Bowie Bunny available as a shell in the catalogue that I ordered in black detail? Or is the coloured Bowie Bunny solid?

-Whystler

Subject: Re: Thin Walls
Posted by [chronopsis2](#) on Thu, 21 Jan 2010 23:21:58 GMT
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I've been dealing with the walls issue too.

A few months ago I submitted a handful of small, ~ 3.6 cm high typography models which I had hollowed out to save \$ and weight. They successfully printed, but since then I have been submitting additional similar models which pass uploading but are subsequently rejected at manufacture.

This made me curious about my original letters. Since I modeled them entirely hollow with no front or back, I didn't really know if they were actually hollow.

So today, I cut one open. Lo and behold, it was solid! It could have been made with a laser cutter.

So, SW, was it easier to just charge me for less material (as if my models were really hollow), send me the models as is and never tell me, or what was the issue?

here's the hollow model just prior to STL export:

and here's the cut-open model:

File Attachments

- 1) [hollowAinMaya.jpg](#), downloaded 1534 times
 - 2) [A_cutOpen.jpg](#), downloaded 1552 times
-
-

Subject: Re: Thin Walls
Posted by [EricFinley](#) on Fri, 22 Jan 2010 04:40:14 GMT
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From the looks of it, you didn't leave the filling material anywhere to get out, and they missed flagging it upon submission. And then the trapped filling material got solidified somewhat (maybe in some postprocessing step, maybe in shipping, maybe just over time) and is what you see there. Betcha it's weaker than the exterior if you test it.

Subject: Re: Thin Walls
Posted by [Whystler](#) on Thu, 04 Feb 2010 03:13:10 GMT
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Yes, give the surface a scratch. My guess is that it's just packed in tight. You'll probably be able to excavate quite extensively. Do you think?

-Whystler

Subject: Re: Thin Walls
Posted by [pete](#) on Mon, 15 Feb 2010 22:26:31 GMT
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If you do not leave an opening the material stays inside. Due to proximity to solid material and thus heat it gets a bit solid.

It is a trade-off in our pricing model where we do not charge for this material. In effect you could have send the model solid and we SHOULD have charged the same, however we have not cracked the nut to do just that yet.

Subject: Re: Thin Walls
Posted by [Datto](#) on Mon, 13 Dec 2010 23:49:56 GMT
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woody64 wrote on Thu, 22 October 2009 17:21

2. Is there a guide how to deal with such objects:

<http://www.shapeways.com/forum/index.php?t=msg&goto=7393>

If an object has a peak then that results always in a thin wall at the end. Correct or wrong?

In practice, the answer seems to be YES unfortunately. This seems to be the problem I'm having. Tapered shapes are being flagged as walls now when before they were not. Here's an example:

1-43 driver by Dattodesign, on Flickr

Subject: Re: Thin Walls
Posted by [reecejames](#) on Fri, 07 Jan 2011 06:19:48 GMT
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Same here!!

I'm seeing the same problem here with gear teeth. The gear is a nice large wall, but the teeth themselves, which only extend out 0.4mm, are causing the issue.

Subject: Thin wall making us re-order
Posted by [Datto](#) on Thu, 13 Jan 2011 16:20:38 GMT
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Considering how many previously (successfully) printed models are coming back with the thin wall error, Is there any way to streamline how this affects an order? If we could have 24 or 48 hours to edit our models, and re-submit them, and maintain the same order (paying the price difference , of course) That would be very much preferable to the coupon code applicable to the next order. Next order? What unneeded model shall I choose to fill the order out to the \$25 minimum

I'm sure it's great for Shapeways to have another order with another \$25 minimum, but from the customer standpoint, it's unsatisfactory.

Subject: Re: Thin wall making us re-order
Posted by [reecejames](#) on Thu, 13 Jan 2011 21:38:30 GMT
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Well I've successfully had the model above enter production! Big thank you to Kevin for his detailed explanation.

Things to take away in the case of my above post;

• A detail becomes a wall somewhere between 0.2 and 0.4.

• Detail comprised of 1x1x1mm squares or circles is acceptable geometry. (Make small gear teeth out of lots of little cubes)

• Lots of detail seems to crash mesh medic with a too many polygons error. (The model was around 44000 polys when submitted)

Basically a detail with an edge or corner less than 90° and or in a complex shape that does not fit into a 90° angle will be flagged as not printable.

To check if it's safe, draw a 1x1x1mm cube and see if it fits within the geometry touching the outermost surface, if it doesn't, it's not printable.

Best rule of thumb I could come up with.

Subject: Re: Thin wall making us re-order
Posted by [Noshaper](#) on Sun, 13 Feb 2011 10:23:49 GMT
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thanks for your explanation, but I'm not sure I understand this correctly:

• A detail becomes a wall somewhere between 0.2 and 0.4.

To check if it's safe, draw a 1x1x1mm cube and see if it fits within the geometry touching the outermost surface, if it doesn't, it's not printable.

Are you saying a detail smaller than 1mm at any axle can't be printed? I hope I misunderstood you....

Subject: Re: Thin wall making us re-order
Posted by [reecejames](#) on Sun, 13 Feb 2011 11:27:03 GMT
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I'll see if I can explain a little better.

If you create a wall of material. Any item that extends out of that wall, is either a wall or a detail. If a cube of the wall size x wall size x wall size fits within, it's a wall. If it can't, then the maximum it can extend from the wall is somewhere between 0.2 and 0.4 depending on wall thickness and angles on that detail.

In my case, I managed to make the tiny gear teeth on my traction engine using a bunch of 1mm squares, arrayed around the perimeter of the cylinder. Physically there isn't much difference and in actual fact, the teeth are smaller.

Subject: Re: Thin wall making us re-order
Posted by [GWMT](#) on Tue, 15 Feb 2011 19:44:49 GMT
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reecejames wrote on Sun, 13 February 2011 11:27
...In my case, I managed to make the tiny gear teeth on my traction engine using a bunch of 1mm squares, arrayed around the perimeter of the cylinder.

Hi Reece;

Would you mind posting a closeup of the area circled in green? I'd like to see what those squares look like up close and what the spacing is between each square on the gear. You used 1mm squares because the depth (or wall thickness) of the wheel rim the gear teeth attach to is 1mm, right?

Just to double-check your explanation of how surface detail versus wall is calculated: Lets say I add an item extending from the surface of a wall 0.7mm thick (built with WSF material). To check the item I draw a cube on the wall surface centered on the item with dimensions equal to the thickness of the wall (0.7mm x 0.7mm x 0.7mm in this case).

If the item falls within the boundaries of the 0.7mm cube it is considered to be a surface detail and will be printed even though the dimensions of the item are less than 0.7mm (the minimum allowed wall thickness permitted for WSF material). If the item extends beyond the boundaries of the 0.7mm cube it is considered to be a wall and must have a minimum thickness of 0.7mm

(because it's built of WSF material) in all three dimensions.

That steam engine is freaking awesome!! I hope to produce models with that level of detail too.

Scott

File Attachments

1) [Gear Detail request.jpg](#), downloaded 1026 times

Subject: Re: Thin wall making us re-order
Posted by [reecejames](#) on Wed, 16 Feb 2011 06:45:38 GMT
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Certainly

You are quite right.

For WSF

If the item falls within the boundaries of the 0.7mm cube it is considered to be a surface detail and MAY be printable even though the dimensions of the item are less than 0.7mm. If the item extends beyond the boundaries of the 0.7mm cube it is considered to be a wall and must have a minimum thickness of 0.7mm in all three dimensions.

The may is something to do with the angle of intersection with the wall. For instance, the rivets on the engine are printable as they are wider than they are high. I guess that's a good rule of thumb, if it classifies as detail, make sure it is wider in the two dimensions on the wall than it extends from the wall.

File Attachments

1) [Screen shot 2011-02-16 at 5.36.31 PM.png](#), downloaded 1037 times

Subject: Re: Thin wall making us re-order
Posted by [GWMT](#) on Fri, 18 Feb 2011 00:30:20 GMT
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Thank you, Reece!

I'm going to modify the extrusion shown here:

<http://www.shapeways.com/forum/index.php?t=msg&th=4553&start=0&>

I'll make the extrusion 0.7mm thick up to the cutouts, then taper the "teeth" from 0.7mm to 0.4mm over the remaining 0.5mm of the extrusion.

If this is rejected I'll just make the entire extrusion 0.7mm thick and use a sanding stick (<http://www.walthers.com/exec/productinfo/232-525>) to taper the edge down to 0.4mm.

The car will have a few rivets on it - I'll follow your advice.

Subject: Re: Thin wall making us re-order
Posted by [reecejames](#) on Fri, 18 Feb 2011 00:45:35 GMT
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I would expect that to be rejected. That is because it will become a wall somewhere up to the 0.4mm mark from the wall. As it is a long length, it will certainly exceed the the 0.7 in one dimension, thus counting as a wall.

Remember a detail has to be under 0.7 in all 3 dimensions.

My recommendation is to make it 0.701 and then sand it down. You could also do it as a series of small separate details with a small space between them. (Think of like a dotted line of details along the ridge.) That would be allowable.

Subject: Re: Thin wall making us re-order
Posted by [GWMT](#) on Wed, 23 Feb 2011 21:52:00 GMT
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Here's a shape that was accepted for printing. Dimensions shown are in inches (0.1mm roughly equals 0.004 inches):

The thickness at the center of the column is 0.028" (0.7mm), the minimum thickness allowable for White Strong & Flexible material.

The four 'points' of the column extend from the 0.7mm wall 0.35mm and taper from a thickness of 0.7mm at the wall to 0.35mm at their tips - all within reecejames' rule-of-thumb for allowable

surface detail dimensions.

File Attachments

1) [Post extrusion.jpg](#), downloaded 966 times

Subject: Re: Thin wall making us re-order
Posted by [Noshaper](#) on Sat, 26 Feb 2011 09:01:26 GMT
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GWMT,

thanks for showing this example, this is really very helpfull!

I just wonder a bit about the width of your column which is 1.4 mm (0.056 inch), if I correctly understand your drawing. The Shapeway design instructions state that each axle has to be at least 2.5 mm in order to get an object printed? Maybe this rule is handled flexible if one of axles is very long (like the length of your column)!

Are there other examples with printed objects where one axles was less than 2.5mm?

PS: would you share a picture of the printed column, I really would love to see it in real?

Subject: Re: Thin wall making us re-order
Posted by [GWMT](#) on Sat, 26 Feb 2011 19:02:44 GMT
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Thank you, Noshaper.

I didn't explain that the column is an extrusion attached to a larger 4cm x 4cm x 20cm body. I suppose if you wanted to print just the column you could add a small piece of sprue to the 1.4mm side protruding 1.1mm and another piece to the 1.75mm side 0.75mm long to meet the 2.5mm x 2.5mm x 2.5mm minimum dimension requirements.

I'm waiting for the model to be printed and shipped (assuming it can be printed and it arrives in one piece). Here's a 3D closeup shot of the model

There's a sprue connecting the top of the columns together to hopefully prevent anything from breaking.

File Attachments

1) [ONR4500 3D view.jpg](#), downloaded 914 times

Subject: Re: Thin wall making us re-order
Posted by [GWMT](#) on Sat, 05 Mar 2011 06:15:51 GMT
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It's here - the columns turned out pretty good. Here's a quick shot of one end.

File Attachments

1) [Post Printed.jpg](#), downloaded 858 times

Subject: Re: Thin wall making us re-order
Posted by [reecejames](#) on Sat, 05 Mar 2011 06:52:24 GMT
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Fantastic! Glad to see it worked for you!

Subject: Re: Thin wall making us re-order
Posted by [GWMT](#) on Sun, 06 Mar 2011 18:28:05 GMT
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Thanks, Reece! Your advice was crucial to making it work out on the first try.

The posts are 38mm tall - it's right on the edge of what can be printed as an unsupported extrusion. See how the post in the middle has twisted slightly to the left? I'm going to add some sprue to the center of the posts to stabilize them.

File Attachments

1) [ONR4500 Posts Detail Pirnt.jpg](#), downloaded 848 times

Subject: Yet another thin wall rejection
Posted by [frank2056](#) on Wed, 09 Mar 2011 04:28:50 GMT

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I think the most annoying "feature" of Shapeways is the seemingly arbitrary rejection of parts due to thin walls. I just had a model rejected because of this.

What's ironic is that I made the new parts thicker than the same part which had successfully printed many times before.

The image below shows the ""thin wall" error, with the successfully printed thinner parts below (all more than 1.7mm thick at the thickest). I believe that the error is in the large wings at the bottom of the image.

So why does a thicker part (2mm thick at the thickest) get rejected when in the past I've had at least six of the large wings printed - with absolutely no errors? The new wings are as thick as the smaller wings in the image above.

It's like throwing darts -blindfolded.

Frank

File Attachments

1) [wings.jpg](#), downloaded 816 times

Subject: Re: Thin Walls

Posted by [oopsclunkthud](#) on Wed, 06 Apr 2011 14:19:55 GMT

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OK, I can see where detail becomes wall thickness. I can see that a tapered edge could get flagged. But I still can't see what's wrong with the following models. Both have been printed many times and now they are being flagged as having thin walls.

In both cases the walls are 1.5 or 2.0mm (well above the 0.7 for SF) the the section flagged seems to be across the face of a curved surface. Support could find nothing wrong with it but could also give me no remedy other than to "adhere to the design rules for the material."

File Attachments

1) [114934-1.jpg](#), downloaded 742 times

Subject: Re: Thin Walls

Posted by [oopsclunkthud](#) on Wed, 06 Apr 2011 14:22:22 GMT

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Here's the second model that was also flagged for thin walls across a curved surface.

File Attachments

1) [114935-1.jpg](#), downloaded 769 times

Subject: Re: Thin Walls

Posted by [stop4stuff](#) on Wed, 06 Apr 2011 16:07:24 GMT

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Option 1.

Grab yourself a copy of NetFabb Basic, measure the wall thickness at the same point, take a screen shot and reply to the rejection email with your image and ask for an explanation in further detail exactly what is wrong.

Option 2.

Update the model with the exact same file and re-order - different operatives see different things

Subject: Re: Thin Walls

Posted by [oopsclunkthud](#) on Wed, 06 Apr 2011 17:55:04 GMT

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Thanks for the hint about netfab, needed that in my toolbox.

Looks like there may be a scale issue (out of the blue, as this has been printed many times already) as the walls are 2mm at the point indicated yet the screen shot shows .002.

Anyhow, I've gone the route of downloading and re-uploading the same model. Passed validation and ordered to see how it goes this time.

Subject: Re: Thin Walls

Posted by [stop4stuff](#) on Wed, 06 Apr 2011 19:09:37 GMT

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Ah... that old chestnut!

I've had models rejected for being too thin by a factor of 1000 too. Looks like some operatives have their settings to millimeters and others to meters.

Subject: Re: Thin Walls

Posted by [Nane](#) on Wed, 06 Apr 2011 19:11:55 GMT

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I'm just glad this is being worked on. It is very disheartening to upload a complicated model, finally have it pass all the checks after fixing it many times, then ordering it just to have it rejected when you are ready to print and by. I have had to cancel many orders because of this. So anything that Shapeways does to make this more accurate and better with less overall rejections is fantastic and I thank all you guys for constantly striving to better your much appreciated service.

To kind of add on to what dadrummond said, I guess you will have to draw a line at some point to what is considered detail on a surface or whether it sticks out far enough to be considered its own object. Like a nose on a miniature is always very small. But since it is not very big then it would/should be easily passable and printable. However a nose like Pinocchio on a miniature would be too long and thin and subject to breaking. Thus getting rejected. I think one of the best things is to simply eyeball the problem areas on your side, considering the size of the print and make a judgement call if the print is practical or not.

For instance, one upload I did that got rejected, the miniatures teeth in his mouth were too thin which I totally understood. However I had some larger teeth as part of his necklace that were considered too thin as well, however they were sticking out of his chest so I think they would easily and safely print. But they were hanging out pretty far so that was my fault in design. But yeah, it is a fine line and something I need to remember when I am designing. Its just not up to you guys, I need to work within practical limits. but some solid understanding and realistic flexibility would also be greatly appreciated.

Thanks for your time!

Subject: Re: Thin Walls

Posted by [dynath](#) on Thu, 19 May 2011 07:11:43 GMT

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Ok I'm new to this whole process and recently had two separate orders flagged as having walls that are too thin walls. I realize now the wall thickness error is really caused systemically in my modeling. I'm wondering if there is actually any tool which will calculate the thickness out there or if it is all just a manual thing were I need to start the habit of cross sectioning and measuring every part. I found a blender plugin on these forums but since it doesn't work with any of the versions of python and blender I've tried installing (probably my fault) I'm kind of hoping there is another option out there. It seemed that "tools" were vaguely mentioned at the start of this thread, anyone know what those "tools" are?

Subject: Re: Thin Walls

Posted by [stop4stuff](#) on Thu, 19 May 2011 07:52:35 GMT

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Grab yourself a copy of NetFabb Studio Basic (free), it has all sorts of measurings tools including wall thickness.

Subject: Re: Thin Walls

Posted by [dynath](#) on Thu, 19 May 2011 22:37:05 GMT

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Thanks, Netfabb seems pretty useful. I was hoping for an automatic script or something that would flag areas of models without me spotting dangers before hand but this is the next best thing.

Is there any word if Shapeways is building such a script to check wall thickness on upload?

Subject: Re: Thin Walls

Posted by [reecejames](#) on Fri, 20 May 2011 00:06:14 GMT

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This is one of the reasons I'm loving Lightwave for my modelling. It gives you some amazing tools during construction that prevent you from making thin walls, but then also lets you measure

between two surfaces, edges or points while editing. (It's an Lscript plugin called pnt2pnt I believe)

It's the semantics that catch us all out from time to time, but there's always a way around it

Subject: Re: Thin Walls

Posted by [stannum](#) on Fri, 20 May 2011 02:54:24 GMT

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Blender itself can print edge length or face area among other things (press F9). Of course, not so useful if the distance is no a single edge... so others just create a cube or sphere of the right size, move it around, and try to check if it's visible from both sides of the thin areas. Or flip the normals (adjust normal size to match minimum) as rulers to check if they poke out in some place.

Subject: Re: Thin Walls

Posted by [dynath](#) on Thu, 26 May 2011 20:18:34 GMT

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I see, so inspite of shapeway's assurances back in 2009 that they were working on a checking tool the community is actually relying on the tools available in rendering packages designed for non-solid modeling or using work arounds created based on the community's personal experiences. Well as I said its good to know where we stand. Since I can't afford to buy lightwave and frankly blender baffles me i'll probably try that cube/sphere thing. But if shapeways staff actually is reading this thread still, it would be really nice to be able to have an automated checker of some kind, or maybe even a submission cue were the model is actually manually reviewed before someone orders it. Personally i'm trying to be proactive to fix my modeling before I submit the models but I feel horrible when someone else orders my model and I get that "order canceled" email hosing a potential customer. Its not shapeway's fault i know its mine, but some help fixing it would be really... helpful.

Subject: Re: Thin Walls

Posted by [uncookedtrout](#) on Mon, 01 Aug 2011 18:40:47 GMT

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I skimmed through the 78 posts before me and didn't see this addressed, my apologies if it is. Can we have the option to print a model even if it doesn't meet min wall thickness, knowing that the integrity can't be guaranteed? The one time I had wall thickness issues, the issue came from detail work. This option would be great for rapid prototyping, as in my case once I received the print it ended up being too small and I need to scale the whole thing, which would have solved the

min wall thickness issue, if I hadn't already spend the time to remodel objects. Something simple as another check box when you upload the file would suffice. This would also save production time, because your employees would not need to manually check any walls. Obviously Shapeways is conscious of the quality of product they deliver, but customers should be allowed to forgo the quality insurance measures if they choose.

Subject: Re: Thin Walls

Posted by [stop4stuff](#) on Mon, 01 Aug 2011 20:14:14 GMT

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Uncookedtrout, it's not just an issue of what we, as customers, want with wall thickness, there is also a physical print consideration. A few examples; WSF has a 0.7mm wall thickness because much thinner has the possibility of breaking off during the print process and ruining the whole print run. Stainless steel is printed as a steel powder bound together with an organic binder, the part has to be handled and cleaned before it is infused with bronze. The thinner the part, the less likelihood it has of surviving.

You could contact Sapeways direct via the contact link at the very top of the page to see if they would be prepared to go with your idea, they've entertained thin/small parts in the past with the detail materials.

Subject: Re: Thin Walls

Posted by [dynath](#) on Mon, 01 Aug 2011 20:30:33 GMT

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Actually uncookedtrout this has been answered before but not in a definitive yes or no terms. From the responses i'd say the answer is actually No, shapeways cannot print items in exception to the wall thickness policy. A lot of people debate what actually the limitations are for but its a mixture of quality, printer limitations, worker limitations, and general safety at issue.

Quality clearly degrades below a certain detail size but also a part breaking off your model can damage other models printed to different specificaitons.

As pointed out before printers can't actually print below a certain point, this goes beyond just detail loss but actually results in entirely missing structures which may cause items to crumble or warp. Again items of small size present problems human workers can only do so much to save pieces which are printed to thin, handling and washing can cause damage and each time they destroy the piece they have to start over wasting their time and materials.

I've read about 3d printers breaking when they get clogged by small items. To the point that

they've caught on fire because of clogs. Its rare but it can happen. breakage is pretty common when dealing with machines that are abused outside of their capable parameters.

Subject: Re: Thin Walls

Posted by [matt_atknsn](#) on Fri, 26 Aug 2011 20:29:02 GMT

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Hi,

Replied to this thread instead of a new post, to find out if I understand the concept of thin walls directly: any measurement in any axis/dimension/XYZ that is more than the minimum wall thickness is a 'wall', otherwise it'll be treated as a 'detail'... did I get it right?

Please consider the attached/below screenshot of a model battleship to be done using Frosted Ultra Detail (minimum wall thickness of 0.3mm)

http://www.shapeways.com/model/318339/french_navy_battleship_pack_1.html

A. Red:

1. the first level, extruded from the ship's hull is around 0.6mm x 0.4mm x 0.2mm... therefore a wall if I understand correctly?
2. The next level would be like a dagger/cross, with each cube at 0.11mm; thus whole cross structure is 0.33mm x 0.33mm x 0.22mm. Is it considered a wall (if measured from the front cube face to the rear cube's face) or detail if the smaller cubes are considered?

B. Yellow

1. level 1 is a wall, certainly level two even if it's just 0.1mm, correct?
2. level 3: each 'box' is 0.11mm x 0.2mm x 0.15mm; intentionally designed for the gap to fuse upon printing... a detail then?

C. Green

It's a 0.11mm diameter, 0.15mm tall cylinder stuck to the side... detail yes? Unrelated, but will it have any problem printing like being 'too small'?

The model will probably fail the process due to numerous 'thin walls', just wanted to confirm that I get the concept right this time before continuing...

Cheers!

File Attachments

1) [ThinWallsQuery.jpg](#), downloaded 988 times

Subject: Re: Thin Walls

Posted by [stonysmith](#) on Sat, 27 Aug 2011 13:18:09 GMT

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First: I have from time to time emailed Customer Service (service@shapeways.com) to request a "Thin Walls Check", on a model which they have done gladly. I do try to keep the number of those requests to a minimum, so as not to overload them with extra (unpaid) work.

Second: I'll try here to give you my (personal) perspective of "wall" versus "detail". I do wonder if some of your parts are going to have difficulties. I may be completely wrong, but I think all three areas you've highlighted will pass. I have a bit more concern about the post that is sticking up just above the green area, and the two horizontal posts to the right of that. How big around are those posts?

What has worked for me is this analogy: Rivets along a surface are Details.
Wires/Ropes/HandRails attached to "anything" are Walls.

In mathematical terms: ANY open plane (ignoring the edges) must meet the wall thickness (WT) rule if its distance to a supporting piece is greater than WT.

=====

Your models look to be some extremely nice work, I'm very impressed. My biggest concern would be your gunbarrels. If they are longer than WT, then they need to be bigger around than WT.

Subject: Re: Thin Walls

Posted by [matt_atknsn](#) on Sat, 27 Aug 2011 23:24:36 GMT

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Thanks stonysmith, much appreciated! I'll keep it in mind about CS.

Indeed the vertical one will give a positive: it's 0.17mm x 0.37mm; the two horizontal ones are 0.11mm x 0.18mm up to the vertical face under them but are up to 0.58mm to the middle structure. These have been updated, but not yet uploaded: the whole model/s are being worked at, as there are structural parts less than 0.3mm (for FUD)

The gunbarrels to the right are also being worked on: 0.31mm diameter, with faux support underneath...

Thanks again and cheers!

Subject: Re: Thin Walls
Posted by [cbfasi](#) on Wed, 28 Sep 2011 15:46:52 GMT
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I just got an interesting reject..

On my order the T10 x3 rejected but the T10 x6 was fine (turns out I had ordered the T10 x3 by mistake) but what makes this really interesting is the only difference is the number of T10's in the file, the rest is identical !

Subject: Re: Thin Walls
Posted by [dynath](#) on Wed, 28 Sep 2011 16:38:19 GMT
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Wall thickness is not automated. a person actually has to press a big red reject button or something. Its often a matter of their opinion.

Subject: Re: Thin Walls
Posted by [Kaczor](#) on Thu, 05 Jan 2012 22:46:12 GMT
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Hello. It's my first post here I have question - is it possible to print that kind of beams in FUD? One side is touching thick wall.

File Attachments

1) [fud.jpg](#), downloaded 784 times

Subject: Re: Thin Walls
Posted by [stonysmith](#) on Fri, 06 Jan 2012 14:41:50 GMT
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In a word, No.

The 0.2mm on the outer side will be rejected as too thin. Make it 0.3mm and it "might" be accepted, but.. You may find that that "L" shape sticking out from the wall will crumble under the slightest handling. 0.6mm is considerably safer.

Subject: Re: Thin Walls

Posted by [Heiner2](#) on Sun, 08 Apr 2012 11:05:41 GMT

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Hello there,

the 'thin wall rejection' issue is so manifold, may i add another aspect:

Models which surpass a certain size, and shall be printed in WSF, must have an even bigger wall thickness. Everything with edges /sides over 12cm (or so) must be at least 1mm strong. The length parameter is applied on the longest side. Reason for the need of an even bigger wall thickness is, that the WSF starts to deform due to thermal issues.

What i am interested in is: Is the 'longest side' considered the longest continuous model element, or the longest total dimension of the model?

As example a screenshot of one of my models. Its total dimensions are something like 19 x 19 x 2 cm. But as you can see, the shape is cut into pieces, which are held together with support beams of 1mm diameter. The longest edge length of the model would be well under 10 cm (approx 9cm). How would Shapeways apply the size of model / wall thickness rule here?

Based on the overall dimensions, or based on the longest 'real' edge?

Best regards,

Heiner

File Attachments

1) [Print_Question.jpg](#), downloaded 695 times

Subject: Re: Thin Walls

Posted by [cbfasi](#) on Fri, 27 Jul 2012 19:35:01 GMT

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I am still having problems with SHapeways and models that I have had many prints from before, now getting rejected after getting fixed before the last lot of prints..

http://www.shapeways.com/model/340546/1x_klingon_k22_1_5000.html

http://www.cbfasi.co.uk/Files/355872_-1.jpg

The thickness on the wings.. easy fix, but the front of the bridge... its already been printed, and its part of a curved area, the background grid is 0.5mm, changing this will make a major change to what is a scaled ship.

Subject: Re: Thin Walls
Posted by [stonysmith](#) on Fri, 27 Jul 2012 20:29:36 GMT
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Did you ask service@shapeways.com what the reason for the (new) rejection was?

Subject: Re: Thin Walls
Posted by [cbfasi](#) on Fri, 27 Jul 2012 20:35:16 GMT
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I got sent the unedited version of the image above. Thing is the previous prints of the same model are perfectly fine and the model has not changed

Subject: Re: Thin Walls
Posted by [stonysmith](#) on Fri, 27 Jul 2012 21:58:23 GMT
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Send it back to them and asked "What changed?" I've done this on more than one occasion. Sometimes, it's because a model is particularly troublesome while printing. It "works", but takes them 3-4 retries to get it to work.

Subject: Re: Thin Walls
Posted by [NuttyMonk](#) on Sun, 10 Mar 2013 13:48:36 GMT
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Hi all,

been very confused with the min wall thickness issue.

To help me understand better can anyone tell me how they would go about checking this model (manually or with software) and whether it would be possible to print it in WSF or Sandstone? Any reasons for why the model could or could not be printed would be amazing.

Cheers

<http://www.shapeways.com/model/964841>

File Attachments

1) [PMM Rotator BIG - MODEL \(repaired\).stl.zip](#), downloaded 62 times

Subject: Re: Thin Walls

Posted by [stonysmith](#) on Sun, 10 Mar 2013 15:08:09 GMT

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Download Netfabb Basic from www.netfabb.com. It's free.

Open the model and you'll get a big red triangular warning sign.. you've got one face that is not closed properly.

Click Repair (the red cross at the top left) and then on the 2nd tab at the right "Actions", click "Close All Holes".

Click "Apply Repair" at the bottom right - that one problem is now handled.

Then, click the purple-ish Ruler for measurements.

In the middle of the right-hand pane, select the wall-thickness tool.

Then, go about different places on your model and click. It will add a measurement at each spot you click.

Go about your model, measuring the spots that you think will be troublesome.

Overall, I'd say that your model looks good - very interesting design by the way - everything seems to be more than 3mm thick, so it should be fine to print in either FCS or WSF.

Subject: Re: Thin Walls

Posted by [stonysmith](#) on Sun, 10 Mar 2013 15:21:54 GMT

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Advanced Instructions:

I thought I'd separate the two topics here slightly. Your model does have an issue of a separated overlapping shell that's not needed.

In Netfabb, select Repair.

Right click the model, and click "Select this shell" and see that it selects the main body of your model.

Right click again and select "Remove Selected Triangles" and you'll see that there are a couple of little floating meshes that are likely not a desired part of your model.

What I do is use the two steps above as exploration, looking for problem areas, and then I Undo the repair to get back to my original model unchanged.

Then: Right click the model, click "Select this Shell", and then right click again and select "Extract Selected Triangles as Part".

This pulls the main body out as a separate peice. As long as it doesn't have any missing areas, then I select "Export as STL" and write out the new model, without the little floating debris parts that the original had.

===

The other way to handle the same situation of small floating peices is to upload the model to <http://cloud.meshlab.com> - it will union all the peices together for you.

Subject: Re: Thin Walls

Posted by [Rivka](#) on Wed, 20 Mar 2013 17:59:42 GMT

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Hi Storysmith,

I thought I reply directly to you because you seem very well in the knowing about Netfabb :}. I have been using Netfabb as you said for checking and repairing when I see the very big exclamation mark. So far so good. And I also check dimensions as you said by clicking on various parts. But I really wondered is there no automatic way of checking your object. I design a lot of wired objects, quite intricate and it is a tedious job to check every part, because apparently I have a blind spot to see where the weak spots are.

How does shapeways do it? Do they like, you say see immediately the weak spot and check it. I would assume they have an automatic system that would check if the model parts have the

minimum wall thickness. But I seem not to be able to find this way in Netfabb. I would like to type in 0,75 mm and do an automatic check if there is any part with less than this dimension/wall thickness.

I have asked shapeways how they do it and also I.materialise (oeh can i name the competition 0-o) But again and again I don't get a straight answer and just refer to the basic page. I cannot believe they don't do this automatically and so it probably wouldn't be netfabb but an expensive homemade software

It makes it really frustrating to get the models back again after checking repairing like a lunatic. Also it is a shame that objects still cannot be uploaded with that rigorous check build in instead of paying shipping costs for no objects.

Thank you in advance for your effort for this short question with a lot of build up words and endings bla bla :}).

Greets Rivka

Subject: Re: Thin Walls

Posted by [stonysmith](#) on Wed, 20 Mar 2013 19:31:05 GMT

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Most of Shapeways rejections come from a manual check just before assembly into the "build". This check is performed by a human, using Netfabb (or a customized version of it). The people doing this have seen thousands of prints, and can generally spot trouble areas just by sight.

I understand that there is an automated check done at the time of upload, but the parameters on that check are VERY loose. Mostly it checks to see that the overall boundaries correct, and is any part too thin for some specific material. That's why when you upload certain models, it's ONLY available in WSF or why it's NOT available in Sandstone, etc.

But, the actual (final) geometry checks are done by a human (at this time).

Netfabb itself does not do an automated check. You can use it to manually ckeck things, but if you miss something, the production people might find that one spot you missed. There is a new program out there (referred to in another thread) that seems very interesting to me. It will give you a "heat map" of your model with coloring based upon the thicknesses.

The problem with an automated program is likely going to be that it will fail airplane wings every time they are checked. The humans know that a certain amount of "tapering" is acceptable, but the automated programs to date don't make that decision correctly.

=====

One thing to understand.. not all models are rejected BEFORE printing. Shapeways actually goes a bit overboard TRYING to make prints work, and they lose a good bit of money on prints that don't survive being taken out of the printer, or they don't survive being cleaned, no matter how careful they are.

Subject: Re: Thin Walls

Posted by [Rivka](#) on Wed, 20 Mar 2013 19:50:00 GMT

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Hi,

Thank you for your answer. Very clear indeed, so my eyes need to be trained more. It is just such a disappointment every time when my models are rejected (not only for to thin walls though) but alas.

The software you talk about does sound very interesting, it would be helpful with checking the model, but I understand not to see it as a perfect check.

I tried to google it because on 'another' thread is a little to vague for me with all the thousands of threads that are going on. No luck though.

Thank you again.

Greets Rivka

Subject: Re: Thin Walls

Posted by [stonysmith](#) on Wed, 20 Mar 2013 20:28:46 GMT

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Took me a bit to dig up the thread:

http://www.shapeways.com/forum/index.php?t=msg&&th=1_3129&goto=63205#msg_63205

Their free "Viewer" can do the measurements you need. Here is it applied to one of my models. Anything in Cyan or Blue could lead to a rejection, including that section above the rear window that (should be) solid.

File Attachments

1) [3dTool.jpg](#), downloaded 380 times

Subject: Re: Thin Walls
Posted by [Rivka](#) on Wed, 20 Mar 2013 20:37:17 GMT
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Oh my Stonysmith,

you are a hero indeed!!!! Thank you very much for all that trouble, I know what a work that must have been. I will check it out asap.

many many thanks and more thanks :}

Subject: Re: Thin Walls
Posted by [Narada_Dan_Vantari](#) on Thu, 29 May 2014 13:13:43 GMT
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Wow so this thread was started 4 and a half years ago and has not had a post in over a year !
And yet its still sticky lol !

So what I would like to know - now that we have the automated fixer tool for thin walls ...
is does it actually work ?

I have applied it to a number of models that were nearly okay for their wall thickness
and it seems to improve some areas

but it does not remove all the unprintable area -
so what use is it really ?

Is anyone finding that it actually makes unprintable models printable ??

When I first run the fixer and it offers me the download files
if I click the Save&Exit does it replace the uploaded file with the new 'fixed' one ?

How come some seemingly simple to fix areas are not improved by the fixer ?

Question for Shapeways - it seems that the manual tests of printability are only done at the last
moment before printing.

This means waiting sometimes 2 to 3 weeks to be told an item is not printable in a particular
material.

Couldn't you prioritize assessing whether a model is printable as soon as the order is received ?
How about even charging us for priority assessment - I would gladly pay \$5 just find out quickly

whether it will be rejected or not...

Thanks - DV

Subject: Re: Thin Walls

Posted by [Sabaku_Ika](#) on Sun, 01 Jun 2014 16:34:08 GMT

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This is a very big thread and I may have missed this already being answered-- If the thin wall checker gives a model an exclamation point in a triangle instead of an X, does that mean it's risky but can still be printed/sold? Or only by the maker? Thanks.

Subject: Re: Thin Walls

Posted by [AmLachDesigns](#) on Sun, 01 Jun 2014 16:45:01 GMT

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The Thin Wall Checker is indicative only - you can still order with the triangle + ! sign. Click on this sign to go and see where the thin parts of your model are (click on numbers 1-8).

If you do order the model, it will still be inspected by a human to see if it can be printed, so it is possible it could still be rejected.

Good luck...

Subject: Re: Thin Walls

Posted by [natalia](#) on Wed, 09 Jul 2014 16:31:24 GMT

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Hey guys,

I wanted to post an update on our rejections process, named Project Caterpillar:

Read all about all the improvements we've made over the past six months here.

It's worth a read since we've done SO MUCH, but here's the relevant section about Wall Thickness:

#1 Thin Wall Checking and Fixing.

When we looked into the data for why we had to reject certain designs, it became clear that the biggest issue preventing them from passing our manual checks was in their structural integrity: they had "thin walls" and weren't strong enough to withstand the whole production process. While a large part of the process your product goes through is just bits and bytes, after a product is taken out of the 3D printer, it is physically touched at least 5 times in cleaning, quality checks, packing, and more. While our printers can produce nearly anything, you can imagine when blasting excess material off your model with high pressured air, your model will need some strength to survive. Soon enough our team decided to surface critical checks of your models on upload; the thin wall checker was one of the first of these tools released on our website. Shortly followed by the thin wall fixer, which in many cases can help solve issues with your models that would have otherwise caused the models to be rejected. We have lots of huge plans for this area, so we can show you the path, right at upload, to producing your model successfully.

And we invite you to submit continuing good ideas in this thread!

Thanks!
Natalia
