Subject: How do I make one "skin" without overlapping geometry?
Posted by dwygre on Wed, 16 Jan 2013 00:36:10 GMT
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Hello,

I am a first time 3D designer and printer. I am working on printing a teacup, and have been refining the design after getting feedback here and at Ponoko.com. I am getting close to printing this project, but one of the support staff at Ponoko, after reviewing my STL file, recommended I make the teacup all "one skin" instead of having the "overlapping geometry" on the base of the cup. So my question is this, what does "overlapping geometry" mean in terms of 3D design/printing, and how do I remove it from this design? I have attached my STL file.

Thanks in advance for your help.

File Attachments

1) The_Thomas_Teacup.stl, downloaded 77 times

Subject: Re: How do I make one "skin" without overlapping geometry?
Posted by stonysmith on Wed, 16 Jan 2013 01:47:27 GMT
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Upload your file to http://cloud.netfabb.com/ It'll take care of it for you.

Subject: Re: How do I make one "skin" without overlapping geometry?
Posted by dwygre on Wed, 16 Jan 2013 03:01:29 GMT
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I get a processing error when I try that service.

On a related note, I have previously repaired this design in netfabb. Attached is my netfabb project file.

Any other ideas? I can upload my Sketchup file too if needed.

File Attachments

1) The_Thomas_Teacup.fabbproject, downloaded 61 times

Subject: Re: How do I make one "skin" without overlapping geometry?
Posted by Fredd on Wed, 16 Jan 2013 23:39:49 GMT
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For a model in any program to be 3D printed in any program, It must be manifold,have correctly oriented normals, and abide by the materials guidelines.
In SU, a model has to be a solid component to be printable. You have the opportunity at SW to let meshmedic take several solid components and perform a boolean union to create a printable model(Manifold/correct normals) from several selected components you select/export/upload.
That is why Marcus's solid inspector link is helpful.
SU's outershell tool performs the same boolean operation, removing unneeded entity's. Outer shell needs solids also!!
The reason netcloud failed you was nonsolid components.
Sometimes it is necessary to just start over a model, utilizing new techniques you have learned. It will not be the first time it has happened.

Keith

Subject: Re: How do I make one "skin" without overlapping geometry?
Posted by dwygre on Thu, 17 Jan 2013 01:31:14 GMT
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Thanks for all of your feedback. Again, I am a noob, so most of your post went over my head.

Overall, I certainly am willing to start over if needed, but I am unclear as to what the actual problems with the design are.

What does it mean to be "manifold"

What does it mean to have "correctly oriented normals"? If it means, having the appropriate side facing into the design versus out, I thought I had done that? (I attached my SketchUp file)

How do I make this design solid?

Thanks again for all your help!

--dwygre

File Attachments

1) The_Thomas_Teacup.skp, downloaded 66 times

Subject: Re: How do I make one "skin" without overlapping geometry?
Posted by stonysmith on Thu, 17 Jan 2013 05:01:55 GMT
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First, check the definition of Manifold here:
http://www.shapeways.com/tutorials/things-to-keep-in-mind

Second:
If you take your SKP model and export it as an STL, then open the STL in Netfabb, you'll see that there are some problems.

In Netfabb, click Repair. The first thing you'll see is that the model is 767 separate shells. That alone is not necessarily a problem, but it's definitely not ONE single shell.

While still in Repair mode, right click the main body of the cup and take the option "Select this Shell" then select "Remove Selected Triangles"

Now, look at what's left.

As you rotate this part that is left, you'll notice that some peices are displayed in Red. That means that the "normal" is flipped inside out.
You will also see that many of the peices of the handle are separate shells.

I think there's a tutorial somewhere here about fixing the problems within Sketchup. I hope that you don't have to re-draw the whole handle.

File Attachments

1) Teacup.jpg, downloaded 302 times

Subject: Re: How do I make one "skin" without overlapping geometry?
Posted by SteveS3D on Thu, 17 Jan 2013 15:13:22 GMT
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Does it really matter if geometry is overlapping as long as everything is solid? I did a quick test with a sphere and cube overlapping each other. In one test I Booleaned them together into one mesh. In the other test, I left them as two overlapping meshes. When I uploaded them to SW, they were the exact same price.

I'm into modeling mechanical things with lots of small parts like bolt heads and rivets, etc. Trying to boolean everything together can be a pain.

Steve S

Subject: Re: How do I make one "skin" without overlapping geometry?
Posted by stonysmith on Thu, 17 Jan 2013 16:18:08 GMT
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Well.. the answer to that is rather tricky.

If you are designing for the non-color materials, it doesn't much matter, with three exceptions:

1) Netfabb Basic (and other software) reports the volume of your object as the sum of all the separate volumes. Two 1cm3 cubes will report as 2cm3, even if they are overlapped. That will cause you to have the wrong (too hign) estimate for the cost. Shapeways uses MeshMedic to compute the volume, and it does a decent job of getting to the right price, but it does make mistakes in rare cases.
2) When the production team uses Netfabb to measure the thickness of the walls, they will get erroneous results and possibly reject models that are valid.

In this image, the two boxes are separate shells. Netfabb measures the thickness of the lower measurement incorrectly, because it starts with the outside surface and works its way inside to the first surface that it finds, not to the exterior wall, as it should. In this case, the measurement sould be 13.7mm, not 3.7mm Often, this causes the production team to think that some wall is too thin. It's better if you union your shells together, because then the production team will get proper measurements, thereby avoiding rejections.
3) VERY small details may get 'optimised out' of your model. There's been some problem with that recently, and having a single shell solves that issue.

If you want to try to union all the shells in a fairly complex model, upload the STL to cloud.netfabb.com - they do a good job of welding all the shells together.

===
But.. if you're designing for color, then there's a bigger problem. In the places where the walls overlap, the relationship of which color to use where becomes very tricky, and many software packages make the wrong assumptions. It's much better to have an actual vertex that defines the border between the two surfaces, and many sofware packages aren't that smart yet. It's better to union the shells together yourself, and ensure that the correct textures have been applied to the correct surfaces.

File Attachments
1) Overlap.jpg, downloaded 277 times

Subject: Re: How do I make one "skin" without overlapping geometry?
Posted by dwygre on Thu, 17 Jan 2013 17:24:41 GMT
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Thanks for everyone's replies, and for your patience.

In SketchUp (see file I previously attached) I created the handle by making many rectangles with the line tool, structures which are evident on the screenshot Stonysmith most recently posted. Again, these were rectangles that were created, so how can they be shells if they have no volume?

With regard to the normals being flipped inside out on the base, I am confused because those red walls face the inside the cup's internal space. Is that not what I want?

Thanks again for your help.

--dwygre

Subject: Re: How do I make one "skin" without overlapping geometry?
Posted by SteveS3D on Thu, 17 Jan 2013 17:39:09 GMT
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stonysmith wrote on Thu, 17 January 2013 16:18
3) VERY small details may get 'optimised out' of your model. There's been some problem with that recently, and having a single shell solves that issue.

Thanks, I'll keep that in mind.

Steve S

Subject: Re: How do I make one "skin" without overlapping geometry?
Posted by dwygre on Sat, 19 Jan 2013 23:04:52 GMT
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Ok, I think I have made some progress in terms of repairing the design/STL. I worked on the design and am now able to get it repaired using the http://cloud.netfabb.com/ service. Here are the results I get (STL file also attached):

http://cloud.netfabb.com/index.php?key=e9818cbdecd870cbc808f78506a0d4cd93409&fixedfile=1

My question then is this, if the wall thickness, etc., of my model are appropriate for the printing material I choose, will this model print without any issues?

Thanks again for all your help.

--dwygre

File Attachments

1) TheThomasTeacupnewscaledandrepaired_fixed.stl, downloaded 63 times

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Subject: Re: How do I make one "skin" without overlapping geometry?
Posted by stonysmith on Sun, 20 Jan 2013 06:00:11 GMT
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If you want to print that in ceramic, the walls are not thick enough.
You've got them at an average 2.5mm, and for ceramic, it needs to be 3.0mm
It's fine for most of the plastics, but for the metals and ceramic, it needs to be just slightly thicker.

Subject: Re: How do I make one "skin" without overlapping geometry?
Posted by dwygre on Sun, 20 Jan 2013 07:04:03 GMT
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How is 3D ceramic printing technology advancing? If I wait a year or two to print this design in ceramic do you think a newer 3D printer will be able to achieve this wall thickness?

--dwygre

Subject: Re: How do I make one "skin" without overlapping geometry?
Posted by JACANT on Sun, 20 Jan 2013 19:33:09 GMT

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You are asking the same questions as your other thread. I gave you answers there.
http://www.shapeways.com/forum/index.php?t=msg&goto=5974 0&#msg_59740

Subject: Re: How do I make one "skin" without overlapping geometry?
Posted by UniverseBecoming on Wed, 23 Jan 2013 02:53:45 GMT
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I love the design! You obviously have talent! I especially love that handle, very elegant.

Yeah I can see why you'd be reluctant to change the design. Adding a millimeter to that rim will detract considerably. To the best of my knowledge, everyone offering 3D printed ceramics are currently requiring the same design rules. Also too, you're going to lose those nice hard edges with the current processes being offered.

Another option though that you might consider is sterling silver. You can keep the current design with the current sterling silver design rules and it's the only other material that can come into contact with food.

Will there be 3D printed ceramic technologies compatible with your design in a year? Yep! I think you can bet on it.