
Subject: How Dense Should a Curvy Mesh Be in Order to Avoid a Faceted Look?
Posted by [GInSpace76](#) on Thu, 24 Oct 2013 14:26:52 GMT
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I am just beginning to create what will be my first Shapeways-printed model. I'm using (and learning on the fly!) Blender for this purpose.

The most prominent part of the model will be made from a 2D curve that is spun/lathed about an axis, much like the various tutorials that you'll find online for creating a goblet or chess piece. I'm wondering how dense the mesh will need to be in order to avoid a faceted look in the 3D print.

The shape that I'm making is roughly cone-shaped, although there is a gentle curve from the base of the cone to its tip. The shape will be about 7 cm in diameter and 10 cm in length.

What would you suggest?

Thanks in advance!

Subject: Re: How Dense Should a Curvy Mesh Be in Order to Avoid a Faceted Look?
Posted by [stonysmith](#) on Thu, 24 Oct 2013 16:21:48 GMT
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My notes here <http://stonysmith.com/wired/scaling.asp> will give you an indirect answer to this topic.

Here's a hyper technical answer:

For maximum accuracy, The size of a facet needs to be 1/2 of the resolution of the printer. Since the resolution of the printers is not published by Shapeways, we can instead use the rated "accuracy" number they do publish..

For example, WhiteStrongFlexible has an accuracy of 0.15mm - that means you should design facets no larger than 0.075mm - if you do, your model will be more accurate than printer can produce.

The problem will be that at 7cm in diameter, that means that for maximum fidelity, you need ~3000 segments around the circle of the cone, and ~1500 segments along the length. That would give you a rectangular polygon count of 4.5m quads or 9.0m triangles. The trouble is that Shapeways only allows uploads of 1m triangles, so a highly accurate model could not be uploaded..

So somewhere on your model, you have to sacrifice a bit of fidelity.

===

But again, that is the technical answer. You can like achieve something generally smooth and still stay under the 1m triangle limit.

Note: if you are printing in Ceramic, the model is dipped in glaze, so the faceting will be substantially reduced. Also, if you're printing in any of the "Polished" materials, then smaller facets will be also significantly smoothed out.

Subject: Re: How Dense Should a Curvy Mesh Be in Order to Avoid a Faceted Look?

Posted by [GInSpace76](#) on Thu, 24 Oct 2013 16:45:58 GMT

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Thanks for the recommendations! I'll keep them in mind as I trudge through learning Blender sufficiently enough to make what I'm trying to make.

Subject: Re: How Dense Should a Curvy Mesh Be in Order to Avoid a Faceted Look?

Posted by [FreeRangeBrain](#) on Thu, 24 Oct 2013 16:59:44 GMT

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I'd only worry about small facets in highly curved areas. The middle of a dinner plate can have fairly large triangles, whereas the rim will need many, many more as the curve over the rim from front to back has a much higher curvature. (Technically speaking, curvature is the inverse of radius.)

Subject: Re: How Dense Should a Curvy Mesh Be in Order to Avoid a Faceted Look?

Posted by [AmLachDesigns](#) on Thu, 24 Oct 2013 17:11:43 GMT

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With things like this it's sometimes easier to make some tests than calculate in advance.

The Model views in Shapeways will give you a good indication of faceting, so why not create several test cones at the size you desire with different mesh density and see what they look like.

You could also play around with the Subdivision Surface Modifier.

Subject: Re: How Dense Should a Curvy Mesh Be in Order to Avoid a Faceted Look?

Posted by [GInSpace76](#) on Thu, 24 Oct 2013 19:24:20 GMT

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Thanks for the additional suggestions! I'm grateful for the variety and quantity of responses. This seems like a super-cool creative community.

Subject: Re: How Dense Should a Curvy Mesh Be in Order to Avoid a Faceted Look?

Posted by [FreeRangeBrain](#) on Thu, 24 Oct 2013 19:44:49 GMT

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"This seems like a super-cool creative community."

It is, but don't go spreading it around or my parents might find out.

Subject: Re: How Dense Should a Curvy Mesh Be in Order to Avoid a Faceted Look?

Posted by [GInSpace76](#) on Fri, 25 Oct 2013 02:41:05 GMT

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I just started modeling the cone in 3D. The size of what you see here is a bit different than what I posted above, because I misremembered the dimensions.

Length: 7 cm

Diameter: 5 cm

This mesh seems dense enough not to seem too faceted when 3D-printed. What are your thoughts?

File Attachments

1) [vv01_blender_wip_20131024_01.png](#), downloaded 61 times

Subject: Re: How Dense Should a Curvy Mesh Be in Order to Avoid a Faceted Look?

Posted by [AmLachDesigns](#) on Fri, 25 Oct 2013 08:05:01 GMT

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Well, a Blender render is not the Shapeways viewer. And I can see facets.

If you printed in wsf the facets would show, imo, if in pwsf less so but probably still visible.

Subject: Re: How Dense Should a Curvy Mesh Be in Order to Avoid a Faceted Look?

Posted by [mkroecker](#) on Fri, 25 Oct 2013 09:54:21 GMT

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Export to stl format and look at it in the (free) netfabb studio basic program - that way you can be sure that the software is not playing any visual smoothing tricks on you, and you will also get to see the current triangle count.

As AmLachDesigns noted, the material you intend to use may play a role as well - depending on what (if anything) is attached to that cone and how sharp you need the tip to be, you could opt for the polished strong&flexible or post-process the part yourself to get rid of facets.

You also might want to do a trial upload at some point to check that you stay within your expected price range - even with a hollow object at minimum wall thickness, it might be quite expensive if the cone is just a smallish detail on a bigger object at that scale.

(Without knowing more, it is anybody's guess if that will become just a mathematical cone sculpture, a mollusk shell, early jet engine or even the minaret tip of a big mosque)

Subject: Re: How Dense Should a Curvy Mesh Be in Order to Avoid a Faceted Look?

Posted by [GInSpace76](#) on Fri, 25 Oct 2013 11:04:35 GMT

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Thanks again for the advice!

Blender reports a face count of about 3500 for the cone-like shapes (two, actually -- the wider one near the back, and the narrower one at the front with the tip).

I also see the facets, even in the Blender renderer. I'll try that NetFabb application, and I'll merge the two cones into a single mesh, then make it a (hollow) 3D object, then upload it to Shapeways to see (1) what it looks like there and (2) how much it will cost to print in WSF and WSFP. If the cost isn't too crazy -- although I expect it to be high, given the size of this part -- I might test print

it, too. Not sure yet. I do expect to sand the print, which is why even though I see the facets even now, I thought it might be acceptable. I suppose the question of acceptability is a subjective one, isn't it?

This cone-shaped thing is part of a larger whole, but this feature makes up about half of the overall object's exterior form.

As for what the object is... it's... this:

Custom Panosh Place-Style Vehicle Team Voltron Toy, Unit #1 (Air Team; Voltron's Head) (The photos are of crude concept models constructed from foam core and posterboard. The designs have evolved and deviated a bit from what's shown in these photos.)

I'm making a transforming Voltron "toy" as a hobby project -- not to be sold. As a kid I always wanted a toy of this version of Voltron that could transform and accommodate (never-made) action figures of its pilots. The combined robot, consisting of 15 separable modules, will look something like this: <http://forums.voltron.com/eve/forums/a/tpc/f/3171005071/m/6273919177?r=5593986977#5593986977>

I suspect the printing cost of this monstrosity will be astronomical, so it might never be fully printed. We'll see.

Thanks again for the advice!

Subject: Re: How Dense Should a Curvy Mesh Be in Order to Avoid a Faceted Look?

Posted by [AmLachDesigns](#) on Fri, 25 Oct 2013 11:17:21 GMT

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If you want it smooth, raise the face count - by all accounts wsf is a real pain to sand. It seems that you have plenty of scope for upping the face count, but beware that 1 face does not necessarily equate to 1 triangle (ngons are possible in Blender) and triangles is what SW counts. Nonetheless you have a way to go the the 1 million limit...

On the other hand...more faces equals longer upload time.

Good luck!

Subject: Re: How Dense Should a Curvy Mesh Be in Order to Avoid a Faceted

Look?

Posted by [GInSpace76](#) on Fri, 25 Oct 2013 12:00:15 GMT

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Thanks! The "face count" that I gave was actually the "tri count," so I think we're talking apples and apples. I think I will increase the density of the cones.
