
Subject: Stickers on a curved surface

Posted by [pirsquared](#) on Sat, 23 Jul 2011 23:49:16 GMT

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Hey everyone,

I am one of the many twisty puzzle designers here on Shapeways, and I have run into a problem that I cannot solve in Solidworks.

Typically, to make my stickers, I project the outline of each piece's exposed surfaces onto a sketch, using the Convert Entities tool. I then do an offset to make the stickers slightly smaller than the faces, and finally add fillets to round out the corners. I then save it as a DXF, and cut them on my university's laser cutter.

This works great for most of my puzzles, since they have flat faces, so the projected outlines of the faces are exactly the right size for stickers. But when the surfaces are curved, as on my Twisted Cubes and Twisted Starminx, a projection of the surfaces onto a plane does not produce the correct shape.

Twisted Starminx:

For the Twisted Starminx, I solved this problem by trial and error. Starting with the projected outlines of the faces, I cut a sticker, checked it against the puzzle, and then edited it in CorelDraw and cut it again. This was a long process, and I would prefer not to do it again.

Twisted Cubes:

For the Twisted Cubes, I didn't have access to the laser cutter, so the stickers you see on the two puzzles above were painstakingly cut one at a time with scissors and an exacto-knife. This was an even longer process, and I REALLY would not like to do it again.

So here is my question:

Do any of you know of a way to take a curved surface and work out the flat shape that would fit on that surface?

I have attached a Solidworks file of a piece of the Twisted Cube. If you would like to have a go at this, but need the file in a different format, let me know, and I will upload it here.

If someone figures it out, I would be open to letting them order one of my puzzles without markup, or some similar reward.

Thanks!

-Eitan

File Attachments

- 1) [Twisted Cube 1 - Side Edge.SLDPRT](#), downloaded 56 times
 - 2) [SANY1433.JPG](#), downloaded 414 times
 - 3) [SANY1570.JPG](#), downloaded 416 times
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Subject: Re: Stickers on a curved surface
Posted by [TurtlesAreCool](#) on Sun, 24 Jul 2011 00:28:53 GMT
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pirsquared,

An interesting problem. The first question is what sort of curves you are using. The second puzzle looks like it has conical curves; I'm not sure about the first one.

Read this page for reference - it explains the types of curves. I'm not certain if you want stickers without cuts, but that depends on the nature of your curves.
<http://www.eng-tips.com/faqs.cfm?fid=807>

EDIT: I do not intend to question your investigational skills, but have you looked at Solidworks forums for an answer to your problem? Your question seems to be fairly common. I have 0 knowledge of SolidWorks, but what I'm seeing in forums seems to indicate that you should be able to flatten gaussian curves at least by converting them to "sheet metal"?

Subject: Re: Stickers on a curved surface
Posted by [pirsquared](#) on Sun, 24 Jul 2011 00:47:21 GMT
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Interesting link.

I am pretty sure that I have non-gaussian surfaces on both of those puzzles, since there is a distinct saddle-point on each face (it's actually at the center of that piece I uploaded).

So it seems that technically, the faces cannot be flattened without distortion. But I'm sure that there's something out there that can get a better approximation of the flattened surface than a simple projection onto a flat plane.

Solidworks is very geometry-driven, so it is not good at dealing with crazy curves. Maybe one of the programs people use to make those awesome mathematical undulating surfaces like this could be useful? (I have absolutely no idea what they use to make those, but they look freaking amazing)

EDIT: (response to TurtlesAreCool's edit)

I have tried messing around with the "flatten" feature, and I have run into the issue that it can only handle gaussian surfaces, and I've definitely got non-gaussian surfaces here.

Thanks.

-Eitan

Subject: Re: Stickers on a curved surface
Posted by [Tigermoth](#) on Sun, 24 Jul 2011 01:09:07 GMT
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Eitan,

I had a go opening your file in Rhino and using the Unroll Surface command...it seemed to work ok but not sure if its exactly what youre looking for...

I cant re-save in Solidworks format but heres the IGES ...let me know if it works or if you need it saved as another filetype.

File Attachments

1) [flatcurve.igs](#), downloaded 58 times

Subject: Re: Stickers on a curved surface
Posted by [pirsquared](#) on Sun, 24 Jul 2011 01:38:59 GMT
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Fantastic! It's perfect!

I'll continue this conversation in private messages with TigerMoth.

Thanks to all who helped.

-Eitan
